THE RAILWAY GAZETTE
A Journal of Management, Engineering and Operation
INCORPORATING
The Railway Engineer · TRANSPORT · The Railway News
The Railway Times · Herapath's Railway Journal · THE RAILWAY RECORD.
RAILWAYS ILLUSTRATED · ESTABLISHED 1835 · THE RAILWAY OFFICIAL GAZETTE

PUBLISHED EVERY FRIDAY
AT
33, TOTHILL STREET, WESTMINSTER, LONDON, S.W.1

Telegraphic Address: "TRAZETTE PARL., LONDON"
Telephone No.: WHITEHALL 9233 (8 lines)

Annual subscription payable in advance and postage free:
British Isles and Abroad.....£2 5s. 0d.
Single Copies.....One Shilling
Registered at the General Post Office, London as a Newspaper

VOL. 79 No. 26 FRIDAY, JUNE 25, 1943

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DIESEL RAILWAY TRACTION SUPPLEMENT

The July issue of THE RAILWAY GAZETTE *Supplement, illustrating and describing developments in Diesel Railway Traction, will be ready on July 1, price 1s.*

GOODS FOR EXPORT

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as indicating that they are available for export

POSTING "THE RAILWAY GAZETTE" OVERSEAS

We would remind our readers that there are many overseas countries to which it is not permissible for private individuals to send printed journals and newspapers. THE RAILWAY GAZETTE *possesses the necessary permit and facilities for such dispatch.*

We would emphasise that copies addressed to places in Great Britain should not be re-directed to places overseas

REDUCTION IN SIZE OF PAGE

To economise in paper our readers will observe a slight reduction in the size of THE RAILWAY GAZETTE *in that the size of the page has been reduced from 9 in. × 12 in. to 8½ in. × 11½ in. The type area of the page remains the same, namely, 7 in. × 10 in., but the surrounding margins have been reduced. This of course detracts from the appearance of the paper, but is one of the exigencies of the war*

TO CALLERS AND TELEPHONERS

Until further notice our office hours are:
Mondays to Fridays 9.30 a.m. till 5.30 p.m.
The office is closed on Saturdays

ANSWERS TO ENQUIRIES

By reason of staff shortage due to enlistment, we regret that it is no longer possible for us to answer enquiries involving research, or to supply dates when articles appeared in back numbers, either by telephone or by letter

ERRORS, PAPER and PRINTING

Owing to shortage of staff and altered printing arrangements due to the war, and less time available for proof reading, we ask our readers' indulgence for typographical and other errors they may observe from time to time, also for poorer paper and printing compared with pre-war standards

The Railway Half Year

THE first six months of the railway year is now approaching its close, and the boards of the companies will shortly meet to consider their policy as to dividend declarations in respect of the period. Because of the fixed rental payable to the companies under the financial agreement with the Government, it is unlikely that there will be any change in the interim dividends as compared with a year ago. At that time, Great Western ordinary stockholders received 2 per cent.; the L.N.E.R. 4 per cent. non-cumulative second preference stockholders got 1 per cent.; and Southern preferred ordinary stockholders 2½ per cent. The L.M.S.R. paid at the full rate on its 4 per cent. preference stocks. The only margin of revenue available to the directors by which these payments could be increased is that relatively small part of the total receipts which is outside the pool, and there can be little doubt that the boards will prefer to await the outcome of the full year before making any adjustment in the distributions which might then be feasible. The fact that the great increases in the carriage of both passengers and goods, to which reference was made in our last week's issue, is not being reflected in any additional return to the proprietors of the lines, is known to be unpalatable to some railway stockholders, but in present circumstances it does not appear likely that their position will be substantially improved in the immediate future. Present arrangements are that the interim statements by the directors will be made in the case of the Southern Railway on July 22, and of the G.W.R. on the next day. L.M.S.R. and L.N.E.R. announcements are expected to be made on July 29.

Railway Wage Negotiations

The position of the railway companies in relation to wage negotiations and similar matters during the period of Government control still seems to be capable of misunderstanding. In referring to the discussions on June 18 between the unions and the Railway Executive Committee for a further advance in pay of 10s. a week, *The Financial Times* stated that "last week the companies made an offer which was considered as very satisfactory, and since then the unions have had a meeting with Lord Leathers, Minister of War Transport." In fact, of course, the companies are not parties to the present negotiations. The Railway Executive Committee, which was set up to act as the agent of the Minister under the wartime control arrangements, speaks in these matters for the Department. In present circumstances it should be clear that the Treasury is primarily involved in any increase of wages to railwaymen, because any advance conceded detracts from the surplus accruing to the Exchequer, after the railway companies have received the rental of £43 millions a year under the control agreement. The direct interest of the railway companies in wage concession will arise after the period of control. There can then be no doubt of the serious position which will have to be faced by them in the light of the substantial advances in labour costs which have occurred during the war. Nevertheless, at the present juncture it is as well to avoid confusion as to the parties directly involved in the wage negotiations; this is not least desirable, with a view to post-war discussions which may arise as a result of the inflated labour costs of the railways, which in post-war times may assume far deeper significance than at present. Details of the latest wage agreement are given on page 653 and are the subject of an editorial article on page 631.

Lost Faith in Royal Commissions

Even the Labour Party seems to have lost faith in the potency of royal and similar commissions on railways. Perhaps the surfeit of these bodies which has affected the transport industry, and the disproportionately meagre results, have been responsible for the cynicism with which the usefulness of deliberations of this kind is now viewed. Because it is likely that there will be a good many whose thoughts will turn towards the establishment of a railway commission after the termination of the war, it is interesting to note that when Mr. J. Benstead, General Secretary of the National Union of Railwaymen, brought before the recent annual conference of the Labour Party a resolution suggesting the establishment of a Royal Commission charged to report within 12 months of the cessation of hostilities in Europe on the steps necessary to bring all forms of transport under national ownership and control, it was withdrawn after several other speakers had opposed it. One view was that the establishment of a Royal Commission might have a contrary effect to that which Mr. Benstead had in view—it might result in nothing at all being done. The general sense of the conference seemed to be to avoid placing too much reliance on the usefulness of commissions, royal or otherwise.

Transport in New South Wales

Transport in New South Wales is reviewed in an interesting fashion by Mr. M. M. Allen, Hon. Secretary of the New South Wales Centre of the Institute of Transport, in a paper which is summarised on another page. Railway construction in the State was begun by the Sydney Railway Company which was incorporated in 1846, but before the completion of the first line in 1855 the Government took over the works, and since then the railway system has been a State affair. The Irish gauge of 5 ft. 3 in. was adopted in the first instance, but in 1855 the gauge was altered to the 4 ft. 8½ in. Victoria and South Australia, however, decided to retain the Irish gauge of their choice. Break-of-gauge necessarily has been a hindrance to the development of traffic between the States. Mr. Allen, however, considers that a greater mischief has been the railway tariff policy of the different States, each of which before the war treated its portion of through traffic as "local" or "originating." With a uniform rate structure throughout Australia he believes that the resulting development of interstate traffic would give the State railways the opportunity to assist the Federal Government materially to carry out at least recommendation No. 1 of the Royal Commission in respect of gauge standardisation.

Overseas Railway Traffics

Some irregularity has been shown recently in the prices of Argentine railway stocks, and traffics for the 49th and 50th weeks of the financial year have not shown much expansion. In the two weeks the Central Argentine has an advance of £24,732 and the Buenos Ayres Great Southern one of £7,080. Buenos Ayres & Pacific receipts for the fortnight are down £12,300, and some results of the crop failure in the Buenos Ayres Western zone are shown in the traffic decrease of £19,620 for the same period. In the corresponding fortnight of 1942 the Western had an increase of £40,860 and the Great Southern one of £22,440. Brazilian railway traffics continue to improve, and for the period January 1 to June 12, 1943, the Great Western receipts amount to £367,400, an increase of £128,700 in comparison with 1942, and the Leopoldina figure of £759,639 marks an advance of £65,579. The San Paulo up to June 6 has obtained receipts of £857,235, an increase of £47,047 for the 22 weeks.

	No. of week	Weekly traffics £	Inc. or decrease £	Aggregate traffic £	Inc. or decrease £
Buenos Ayres & Pacific* ...	50th	86,100	−8,100	4,964,880	+564,120
Buenos Ayres Great Southern*	50th	138,240	+10,320	8,005,500	+693,240
Buenos Ayres Western* ...	50th	50,340	−11,040	2,694,300	+99,240
Central Argentine*	50th	116,790	+5,496	6,538,866	+1,259,958
Canadian Pacific	22nd	1,067,600	+128,200	23,374,400	+2,477,400

* Pesos converted at 16⅔ to £

Antofagasta traffics January 1 to June 13, 1943, amount to £646,280, an advance of £141,530. The Nitrate Railways receipts of £66,640 up to June 15, however, show a decrease of £4,984.

Swedish State Railways' Progress

Neutral, as well as belligerent, countries are feeling the impact of the present war on their transport systems. The Swedish State Railways, serving territory surrounded by countries at war, have had to meet constantly increasing demands. These have arisen not only from military precautions but because of the development of new industries necessary to meet shortages arising from the suspension of imports such as coal and certain chemical products. Goods traffic on the Swedish State Railways, which amounted to two milliard tonne-kilometres in 1938, the last pre-war year, totalled more than 5 milliards in 1942, and those figures do not include ore traffic on the Lapland line. Passenger traffic last year is estimated to have amounted to some 75 million persons, which compares with 47 millions in 1938, which was considered a high figure at that time. During the war electrification has continued to be developed and about 45 per cent. of the lines are now worked by this form of traction; they conveyed some 85 per cent. of the total traffic. Further extensions are planned. Various developments which have occurred in Swedish transport have been recorded from time to time in our pages, and in the current issue, on page 637, we publish an illustrated article, summarising some of the main factors affecting the Swedish railways in recent times.

More Underestimating of German Transport

One of the amazing features of this war is the fact that, although transport is becoming increasingly recognised as a key factor, pitifully ill-informed statements and ill-judged deductions continue to be made about enemy facilities. For nearly four years we have tried to explode the fallacy of the "decadence" of the Reichsbahn, but the story continues to rear its head (usually with the assistance of the Ministry of Economic Warfare) despite the fact that the German railways still function well for war needs. Repeated R.A.F. attacks on German transport fortunately show that the Service departments are better advised. Two new *canards* which have appeared in recent weeks are the "proved failure of the *Reichsautobahnen*," and the "collapse of German goods wagon overloading." The former is based on the reported suspension of routine maintenance of the motor roads in order to release manpower for war work, a step which should make little difference to their war potential for a considerable time, especially as these well-engineered structures now handle greatly-reduced civilian traffic. The cancellation of the permissive loading of railway wagons in excess of their weight markings, which was given undue prominence in a B.B.C. broadcast, appears to represent no change of policy but merely to indicate that all wagons are now lettered with their higher wartime weight-loading markings. Heavy air attack is weakening German transport, but there are no signs of inherent tendency to collapse.

Single-Line Working

Widely varying traffic conditions on single lines in various parts of the world make it almost impossible to devise a system of traffic control that can be efficiently applied to all. Existing methods range from the use of train orders, with or without wayside signals, to absolute block with the electric train-staff, or tablet, and such modern developments as Centralised Traffic Control. The latter, with one man controlling by signal indication the traffic on anything up to a complete sub-division of the line, provides the utmost flexibility in traffic handling, but it is relatively expensive to instal and it requires skilled maintenance. A system that provides for the permissive working of following trains can, in favourable circumstances, afford considerably greater flexibility in working than the absolute block system, and on this account particular interest is attached to the recent development on the South African Railways of a new type of token instrument for this purpose. This has been designed by Mr. Marthinus van Schoor, and is referred to elsewhere in this issue. The system provides for three different methods of single-line working: "Absolute," which is intended to control one train per section between stations at a time; "Permissive," which permits of two or more trains to leave in successive order at ten minute intervals to the distant station of the section, and "Crossing," which controls two or more opposing trains required to cross in a section.

Token Instrument Working in South Africa

Electric token working was first introduced in South Africa in 1900, in which year the Cape lines began to instal the tablet system, and the Natal lines, on which train staff and ticket working had been in use, adopted the electric train staff. With both systems permissive working was allowed for on certain sections. On the old Transvaal lines the Central South African management, formed after the Boer War, began to instal the tablet system about 1902. It is interesting to note that the Cape authorities had considered as long ago as 1901 introducing on its double lines, which were only some 18 miles long, the "American system of automatic signalling." An article in the April issue of *The South African Railways & Harbours Magazine* contains no technical details to enable the nature of the alterations introduced by Mr. Van Schoor to be clearly understood. They appear to consist chiefly in modifications in mechanical details leading to a new general design of token instrument, but not involving any new principle as to the operation of the traffic. The management has made an award of £5,000 to the inventor and it is to be presumed that the new design of token apparatus will be made standard in South Africa.

Wet Ashpits on the L.N.E.R.

In 1930 the L.N.E.R. designed and had constructed two wet ashpits, which were installed at locomotive depots in the Southern Area. They were of ferro-concrete construction and comprised two ashpits, the outer side of which sloped at an angle of about 45° into a water channel. At 50 ft. intervals in each of these ashpits, were platforms entered by steps and a short tunnel from the outside, on which enginemen or fire droppers might stand on raking out the ashpan. With this type of pit a certain amount of effective length is lost as engines cannot be placed so as to use every platform simultaneously. The latest development of this pit is in use at the modern locomotive depot recently opened by the L.N.E.R. in the North Midlands area, as was recorded in our April 16 issue. In this the slope is continuous throughout the length of the pit. No fixed platforms are provided, but instead of the pits sloping from approximately rail level, vertical walls are provided with light rails on the inner sides. From these rails

cages constructed of light-steel sections are suspended; they have a flat floor and roller-bearing wheels, and are easily moved by hand. Locomotives can stand buffer to buffer on the pit; the cages are pushed to the correct positions under the ashpans.

Tractive Effort and Wheel Diameter

There is a story that a youthful railway enthusiast once found himself in the presence of the late G. J. Churchward, and decided to make the most of his chance of obtaining authoritative information on locomotive matters. "Mr. Churchward," said he, "what do you consider to be the best diameter for driving wheels?" "About twenty feet, my boy," came the answer. "But you don't give your engines wheels that size," persisted the questioner. "No, but I would if I could," replied Mr. Churchward. The story is curious, when it is realised that none of Mr. Churchward's designs involved wheels of particularly large diameter; but this may be explained by reasons which Dr. Tuplin, in his article on the subject of tractive effort in relation to wheel diameter which appears on page 640, brings forward to account for the reluctance of many locomotive engineers to use the largest wheels which a particular design would allow. Those reasons are (1) the desire to avoid a high centre of gravity; and (2) the assumption that a design intended for slow-speed work demands small wheels. Dr. Tuplin's careful examination of the actual meaning of nominal tractive effort, and of the danger of assuming it to be a rough measure of a locomotive's capabilities, are the preliminaries to a logical argument in favour of the employment, in any locomotive which may have to run fast, of the largest possible driving wheels. The advantages to be gained by this policy are considerable: the wear and tear on the track is lessened; the hammer blows are much lighter and occur less often (which generally more than compensates for the increase in unsprung weight); the only advers efeature—a possible slight increase in the weight of the reciprocating parts—is of comparatively small importance.

New St. Louis—San Francisco Locomotives

Recent additions to motive-power equipment on American railways include fifteen Baldwin-built 4-8-4 locomotives for the St. Louis-San Francisco Railway. Except that three are fitted for oil-burning all the locomotives are similar; each weighs 462,500 lb., and develops a tractive effort of 69,800 lb. at 85 per cent. of 250 lb. per sq. in. boiler pressure. Cylinders are of 28 in. dia. by 31 in. stroke; the 14 in. piston valves, which are actuated by Walschaerts gear, have a maximum travel of 8 in. Evaporative heating surface totals 4,766 sq. ft. of which 544 sq. ft. are provided by the firebox with its arch tubes and siphons. The superheater surface is 1,508 sq. ft., the grate area 88 sq. ft. The 2,001 lb. of reciprocating weight on each side of the engine is balanced with 601 lb. weight of which 100 lb. weight is located in the main driving wheel and 167 lb. in each of the remaining coupled wheels. The dynamic augment is 8,300 lb. at diameter speed, namely 74 m.p.h., corresponding to a driving wheel diameter of 74 in. The tender is carried on two six-wheel bogies and weighs 275,400 lb.; its water capacity is 18,000 U.S. gal. and its fuel capacity 24 U.S. tons of bituminous coal or 6,500 U.S. gal. of oil. Locomotives with oil firing are for passenger work; the others are for freight haulage.

A Turbine-Driven Locomotive at Work

Little has been published since the war began concerning the performance of one of the most interesting of British locomotive experiments put on the rails during recent years. We refer to the turbine-driven L.M.S.R. Pacific, No. 6202, which is generally uniform with the other 4-6-2s of the first series in all respects other than propulsion by turbines instead of cylinders and reciprocating motion. For some time past this engine has been working frequently on one of the hardest turns of the Western Division—the 8.30 a.m. from Euston to Liverpool, returning with the 5.25 p.m. from Lime Street to Euston, a day's round of 387 miles. Between London and Crewe the load in mid-week is usually 15 or 16 bogies, and over the same course the up train loads to 17 bogies, except on certain week-end days when it runs in two parts. Recently we travelled behind No. 6202 from Crewe, hauling a load which, including two 12-wheel dining cars, weighed 560 tons tare and about 610 tons gross, and the engine put up a fine performance, more than recovering all of a late start, despite two signal checks, by gaining 11½ min. between Crewe and Watford. From a signal stop at Crewe South to Watford the 140·5 miles were run in 156 min. 29 sec., and the net time of 153 min., allowing for out-of-course delays, gave a start-to-stop average of 55 m.p.h. A remarkable feature of this run was the uniformity of its speed; although 96 miles were run at an average of 60 m.p.h., the maximum at no point exceeded 66 m.p.h.

The Further Increase in Railway Wages

DETAILS are given elsewhere in this issue of the agreement reached on June 18 between the Railway Executive Committee and the National Union of Railwaymen, the Associated Society of Locomotive Engineers & Firemen, and the Railway Clerks' Association regarding the unions' claim for an increase in salary or wages of 10s. a week for all adults and juniors, both male and female. This claim was presented jointly by the unions on March 8 and was, we understand, based largely on the greatly increased strain and responsibility borne by railway staff by reason of the vastly increased volume of traffic now passing, the difficulties of operating under war conditions, and the considerably depleted male staff. A further point was, somewhat naturally, the very high level of railway earnings during 1942, more than half of which accrued to the Government. At the time the application was made, the war advance was 16s. a week, at which level it had stood since March, 1942, in the case of staff represented by the A.S.L.E. & F. and since June, 1942, in the case of the other unions. The figure of 16s. was reached in four stages; the dates of the increases were January, 1940, June, 1940, January, 1941, and March/June, 1942. Of these successive increases, only the January, 1941, and the June, 1942, awards were the result of decisions by the Railway Staff National Tribunal; the others were the result of direct negotiations between the unions and the Railway Executive Committee.

In these circumstances it is not surprising that the unions should have again expressed a desire to reach agreement with the Railway Executive Committee if at all possible, in preference to utilising the normal negotiating machinery culminating in an award by the Railway Staff National Tribunal. In view of popular misconception, it should be realised that, although the Railway Executive Committee is composed of the General Managers of the four main-line companies and the Chairman of the L.P.T.B., it has a Chairman nominated by the Minister of War Transport and acts purely as his agent, and not for the railway companies. Thus the members of the committee in negotiating wages questions are in a much more difficult position than they would be if they were acting within the scope of their normal responsibilities.

During the progress of the negotiations between the parties, certain awards were published in connection with claims for war advances by other industries. Such awards do not necessarily control the rates payable to railwaymen but they are obviously a material factor in consideration of a claim for a war advance by a committee acting on behalf of the Minister of War Transport. The first was an award of the National Arbitration Tribunal which gave an increase of 6s. a week to time workers in the general engineering industry, making their total war advance 19s. 6d. a week. This was followed on May 10 by an arbitration tribunal awarding an increase from 16s. to 19s. 6d. a week in the war advance to L.P.T.B. shop staff, and on the same day another arbitration tribunal declined to make any increase in the 15s. war advance at present paid to passenger road transport workers (including those of the L.P.T.B.).

From a purely railway companies' point of view, increases in the war advance during the control period do not affect their financial position because of the fixed rental paid them by the Government irrespective of earnings, although they might have certain post-war repercussions. The General Managers, when acting as the agents of the Minister in the shape of the Railway Executive Committee, however, have to face wider considerations and it is not surprising, therefore, that while expressing the greatest appreciation of the services rendered by railwaymen during the war, their first offer was an increase of 3s. 6d. a week, which would have brought the railway war advance into line with that applicable to certain other industries. This offer was considered by the unions as being inadequate and, as the Railway Executive Committee was unable to offer a higher figure, negotiations were temporarily adjourned.

After the unions had made representations personally to the Minister of War Transport, discussions were resumed with the Railway Executive Committee, and after a prolonged meeting on June 18 agreement was reached that the war advance should be increased from 16s. to 20s. 6d. a week as from April 26, 1943. It is of particular interest that the agreement provides that the additional 4s. 6d. a week shall be paid to all adults, both men and women, whereas the four previous advances provided for women to receive only three-fourths of the advance granted to male staff. Thus they were receiving 12s. a week war advance as compared with 16s. paid to the male staff; and will in future receive 16s. 6d. as compared with 20s. 6d. to be paid to men.

Both sides are to be congratulated on reaching agreement, even though it involved somewhat protracted negotiations. Our

own view, however, is that as the Government has successfully pegged the cost of living by subsidising the price levels of essential foodstuffs, it would have been in the national interest if it had concurrently taken some more definite action as to wage rates generally than merely issuing a White Paper stressing the desirability of wage stabilisation.

This new award applies only to staff earning up to £500 a year, and still further worsens the comparative position of staff whose salaries are between £500 and £1,000 a year. In this connection it will doubtless have been observed that the principle of paying a war advance to staff with salaries up to £850 a year has been conceded for the Civil Servants, and we expect that an early decision will be reached as to this small but vitally important section of the railway staff.

Western Australian Government Railways

THE report on the working of the Western Australian Government Railways for the year ended June 30, 1942, is signed by Mr. J. Tomlinson, appointed Deputy Commissioner of Railways covering the period of the absence of Mr. J. A. Ellis, Commissioner for Railways, whose services were made available, at the request of the Minister for Transport, temporarily to the Commonwealth Government. It is pointed out that the net loss of £62,477 for the year was the lowest since 1938. The better result for the year under review was due to an increase of £424,484 in earnings with an increase of only £268,028 in working expenses. The net return on capital was 3·62 per cent., against 3·04 per cent. in the previous year. There is, however, a warning note as to the considerable increases in costs of wages, materials, and fuel, which, with pay roll tax, war damage insurance, superannuation contributions, etc., have placed an added and continuous burden on the finances. All avenues for economy have been explored to the full, but if the department is to continue on a sound financial basis, the question of an increase in freights and fares must receive early consideration.

There were very substantial increases in passenger journeys and earnings, both in country and suburban travel. The carriage of defence personnel was a big factor in the general increase, and the reduction of civil motoring, also had an effect. The first class receipts of £131,345 in 1941-42 compared with £134,395 in 1940-41 and represented only 14·22 per cent., against 20·97 per cent., of the total passenger receipts. Among the reasons for the reduced proportion in the year under review seem to have been the large increase in military traffic and the curtailment of civilian interstate travel. In goods traffic there was an increase of 34,612 tons in the tonnage hauled and an increase of £84,883 in earnings. As a result of a reduction in the average haul there was a decrease in ton mileage of 9,516,573; but increases in tonnage of higher rated traffic and decreases in tonnage of lower rated commodities, such as wheat and fertilisers, were responsible for the increase in earnings. The principal operating statistics are compared in the accompanying table:—

	1940-41	1941-42
Miles open	4,381	4,381
Train-miles	6,277,745	6,497,115
Passenger journeys	11,518,216	14,532,432
Paying goods and livestock, tons	2,603,857	2,638,469
Ton-miles (goods and livestock)	351,245,171	341,728,598
Average haul, miles	134·89	129·51
Operating ratio, per cent.	77·21	75·72
	£	£
Passenger receipts	640,960	923,526
Goods and livestock receipts	2,651,353	2,736,236
Total earnings	3,571,828	3,996,312
Working expenses	2,757,891	3,025,919
Net revenue	813,937	970,393
Interest charges	1,030,279	1,032,870
Net loss	216,342	62,477

As opportunity offered, improvements have been effected to rolling stock, train services, etc. Among these have been the reconstruction of a number of old and obsolete suburban coaches into a new and up-to-date type, the inauguration of through diesel-electric car services to Albany, and the introduction of a road passenger service between Perth and Kojonup. The provision of six new corridor sleeping cars has been approved. The design of this coach provides for 16 berths (eight two-berth compartments and a shower) and is considered the best arrangement practicable to meet the modern needs for accommodation.

Operating Conditions in America

THAT the general circumstances influencing the working of railways in different countries makes necessary the adoption of various systems of traffic operation is a fact familiar to all who have had to collect information from overseas. Undoubtedly in some cases the differences have persisted because they have been sanctioned by custom, and any appreciable alteration, even if advantageous in itself, must give rise to a period of uncertainty, re-act on other phases of the working, and involve a railway in heavy expenditure. Railway operation in North America developed on widely different lines from those called for in Great Britain, where the heavy traffic which soon sprang up on the majority of routes, called for double lines on most sections, and the advantages of the block system and interlocking were relatively soon recognised. The circumstances in America were entirely different. Most lines traversed long distances, or were part of routes which did so, single track was the rule and numerous passing stations were left unattended; the train crews operated the points for themselves, as indeed they often did even where there was staff on duty at the stations. The train staff method of working was not practicable in most cases. The control of traffic from a central point commanding a given area by means of telegraphic messages, using the working timetable as the basis, was the only alternative to which railwaymen could turn and thus the crossing-order system, as it was called in Great Britain and where it gradually disappeared, became the recognised system of operation. It is true, of course, that the same thing has been used elsewhere, even in Europe, for a long period with fair success, but in many cases the authority of individual station officials was made so great that the principle of central control receded into the background. In America the dispatcher, as the controlling official came to be called, was vested with an authority bordering on the absolute, in the name of the superintendent, for whom he was considered as acting. As in other countries, the various railways at first had their own rules and regulations, gradually built up on experience and adapted to their special requirements, but the diversity which arose from this was unsatisfactory and the then American Railway Association, and other bodies organised among the staffs, formulated a standard practice which, if not adopted in its literal entirety by each company, could serve as the foundation for the rules of all and create sufficient uniformity to obviate previous difficulties. Revisions were made from time to time, but by now the principles of the train dispatching system are so well settled that they are not likely to suffer any further alteration. It must be remembered that they were framed, in the first place, to cover the operation of single-line railways without the aid of any signalling as understood in Great Britain. They had therefore to cover the safeguarding as well as the facilitating of train movements. Even now much mileage has to be so operated, but over the rest of the American routes signalling, properly so called, has been added in various forms, from simple telegraph block to first class automatic signal equipment. This has resulted in the dispatching-rules being modified to some extent, as safety is ensured, in greater or less degree, by the signalling arrangements added to it, but the control over the traffic, as traffic, is still very much centralised. It is to be hoped that an authoritative history of it eventually will be published, as the information is at present buried in one or two little-known books, periodicals, and proceedings of certain associations. The train dispatching system in its complete form is, however, the one feature of American operating methods that is little studied, and the article dealing with it on page 642 may help in understanding it.

AMERICAN BRANCH LINE ABANDONMENTS IN 1942.—Abandonment of branch lines in the United States reached a new high level of mileage in 1942. This has taken place despite increasingly strenuous opposition by local authorities on the ground that the difficulties of road transport due to shortage of tyres and petrol might leave places served by many of these railways without transport if the railways were to be dismantled. In a few cases this opposition has been successful in obtaining from the Interstate Commerce Commission a refusal to permit abandonment, or at least a deferment. On the other hand, there has been the double urge, first of the War Production Board to obtain the released rails and permanent way material for urgent defence projects, and secondly, of the railways themselves to release locomotives, coaches, wagons, and staff from unproductive duties, when all the rolling stock and men available are urgently needed elsewhere. For the first time in American history, aided by several notable and extensive abandonments, such as the lengthy stretch on the north side of the Great Salt Lake in Utah, lines taken up have exceeded in length 2,000 route miles, reaching the record figure of 2,516 miles. The nearest approach to this abandoned mileage was the 1,995 miles of 1934. The 1941 figure of 1,509 miles was only three-fifths of the total in 1942, but for eleven consecutive years more than 1,000 miles of line have been closed annually in this way; the first "over 1,000 miles" year was 1932, and since then the rate of closure, in the conditions outlined above, has been rapid.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Longest Regular S.R. Passenger Train

390, Wakefield Road,
Huddersfield. June 12

To the Editor of The Railway Gazette

Sir,—After reading Mr. Grasemann's comment on my letter published in *The Railway Gazette* for June 11, I hasten to express my sincere regret if I have unwittingly touched on points too obscure for constructive comment.

Yours faithfully,
W. A. TUPLIN

Austerity Locomotives

Mov. & Tn. (Tn5R),
G.H.Q., M.E.F. May 28

To the Editor of The Railway Gazette

Sir,—I read with interest your description of the new austerity locomotive. The designers must be congratulated on turning out a clean-cut and finished engine despite the lack of footplating, etc., that go towards giving the engine its characteristics we are so used to in civilian life.

There are one or two points that surprised me, particularly taking into account the drive to save certain metals. The first is that the coupling rod bushes were made of gunmetal, lined with whitemetal. Surely it is time that both these metals were disregarded in favour of C.I. bushes. Secondly, the inner firebox being of copper, or is this metal easier to obtain than steel firebox plates? Also the use of copper firebox stays in the breaking zone; surely steel flexible stays are the answer. Thirdly, the truck axlebox is of bronze; why not C.I. with bronze bearing?

I note with interest the design of crossheads and the slide-bar arrangement and am anxious to know if the slipper is of C.I. or bronze. In any case it is a great improvement on the L.M.S.R. and previous W.D. type, especially taking into consideration the ease of machining and fitting.

I was delighted to see the size of the tender. A large water capacity is a great asset particularly in foreign working. The tender wheels are also a notable and welcome wartime departure from civilian practice.

Are all the boiler mountings of brass, or has any saving been effected?

Yours faithfully,
J. E. BIRD,
Capt., R.E.

[The "austerity" characteristics of these locomotives have not been allowed to compromise running efficiency or to increase additional maintenance demands, due regard having been given to the abnormal conditions under which these engines may be called upon to work vital and strategic traffic.

Cast-iron bushes in coupling rods have been found to be unreliable and, apart from the fact that suitable low friction cast iron is not now easily obtainable in sufficient quantity in the United Kingdom, wear in a cast-iron bush results in the oil-hole becoming blocked, accelerated wear, damage to crank pin, and total failure. Copper has up to now been more readily obtainable than low sulphur phosphorus content fire-box steel and, of course, a copper firebox is better able to withstand rougher usage and bad waters. With the availability of copper, simplicity of manufacture, saving of man-hours, and fewer detail parts, are adequate reasons for not using flexible stays; moreover, the firebox is a comparatively small one.

Pony truck derailment may result in irreparable damage to cast-iron axleboxes and consequent failure of the engine. The crosshead slipper is of cast iron and provides ample bearing area with white metal inserts inclined in direction across the line of piston stroke. Interchangeability of detail with existing W.D. type and home railway locomotives, together with service reliability, are two reasons why the boiler mountings are made of steam pressure quality recoverable gunmetal.—Ed. *R.G.*]

Locomotive Lineaments

Koyama, West Cliff Road,
Bournemouth. June 10

To the Editor of The Railway Gazette

Sir,—I was very pleased to read Mr. Bulkeley's letter in your issue of May 9, referring in such complimentary terms to myself and the engines which used to adorn the former Great Central Railway. Regarding my chimney design which Mr. Bulkeley so admired, I would point out that my designs of locomotives were fitted with duplicate chimneys; the principal ones inside the smoke box, which I will briefly explain. After many trials in error, it was found necessary to attach the chimney inside the smoke box to the inside of the outer chimney, which of course is vital. However, we eventually arrived at the correct size of diameter of the chimney inside, and also the blast pipe diameter exhausting into the inside chimney which increased the vacuum of the lower portion of the smoke box. In other words, the arrangement in the smoke box was in the nature of an ejector.

Mr. Bulkeley refers to the engines he designed, which were constructed by Beyer Peacock & Co. Ltd., when he called attention to the chimneys. Well I remember calling the same attention myself, when I remarked the ugly chimney had really spoiled the appearance of a very fine locomotive, little thinking he and I were looking through the same spectacles. At that time I was a director of the company.

Yours faithfully,
JNO. G. ROBINSON

Speed, Cant, and Flange Force

8, Comiston Rise,
Edinburgh 10. June 16

To the Editor of The Railway Gazette

Sir,—We are a long way from having heard the last word on this subject, and articles, such as Mr. Rapley's, which you published on May 21, are welcome even if, and I do not say this is so in his case, they do no more than point to the gaps in our knowledge. At the end of the second paragraph, the beginning of the third, and elsewhere he deals with the great cant myth, namely, that flange pressure is nothing more than centrifugal reaction, in a way that should help to consign that hoary delusion to the oblivion it deserves.

Coming to the question of comfort, I am less able to agree with him. Comfort, being a sensation, cannot be diagnosed by the method of comparative measurement, but we can note its qualities. If the assumption is true, that discomfort is conditioned by cant-deficiency simply, then its effect should be more or less continuous throughout a cant-deficient curve, whereas any traveller can testify that it is discontinuous and even oscillatory. To adopt a hypothesis which is contradicted by experience and deduce from it a working rule for maximum speeds, leads to the sort of errors which elsewhere Mr. Rapley is at pains to expose.

Apologising for the anatomical euphemism, I suggest that the cardinal feature is the path in space traced by the point of contact between the passenger and the vehicle, in short, velocity, in its restricted scientific sense, and not cant. This approach certainly presents difficulties, but the road to error is paved with over-simplification. If, as here claimed, the result appears to comply with common usage, either Mr. Rapley has adjusted the theory to suit the solution, or it is coincidence which will deceive the unwary.

Yours faithfully,
REGINALD PETERS

Railway Travel in West Africa

G.H.Q. West African Forces
April 17

To the Editor of The Railway Gazette

Sir,—It is now six weeks since I gained my first view of the continent of Africa, during which time I have gained many interesting impressions. I am stationed a short distance inland, a few miles from a large town. The situation is pleasant and conditions are good. We live in small circular huts with thatched roofs—two men to a hut—and have African boys to look after us. Since my arrival the weather has been kindly and by no means unbearably warm.

Very soon after my arrival on the west coast I undertook a lengthy railway journey. Travelling in the first class coaches is quite pleasant—they have leather seats, a table, and an electric fan, and the sole annoyance is the dust which blows up from the track. Gazing out of the windows for any length of time is tedious, for the scenery remains of the "bush" type for mile after mile.

At even the smallest stations the villagers turn out *en masse* to meet the train and the platform swarms with a motley crowd ranging from tiny tots to venerable patriarchs. Much of the track is severely curved and heavily graded, but, considering the difficult nature of the country, it is well laid out.

On my free days I usually go into the town, mainly on shopping expeditions. The largest stores are run by European-African trading concerns, although Indians and Levantines are also great shopkeepers here. The most heterogeneous collection of wares is displayed in the shops, but of all articles coloured cloth predominates. In addition there are the Hausa merchants who squat with their goods upon the pavement and who argue with the persistence of born traders.

The absence of blackout and rationing are agreeable features of life here, but prices are by no means low, even of articles locally manufactured.

Yours faithfully,
B. G. WILSON

The Scrap Heap

So large is the increase in the L.M.S.R. passenger travel—mostly by Service personnel—that no fewer than 28 expresses often comprise as many as 16 and 17 vehicles nowadays.

* * *

The historic section of the old Southern Pacific Railway between Corinne and Lucien, which was dismantled last autumn to provide rails for a Naval supply depot, is to be converted into a highway 115 miles long. It may be recalled that this was part of the original route of the first transcontinental railway, which was completed in May, 1869.

* * *

The house flag of the Southern Railway Company's well-known cross-Channel steamer *Canterbury* has been presented to the headquarters of the Canterbury branch of the Navy League Sea Cadet Corps. The flag is weather-worn and battle-holed, as the *Canterbury* has been in Government service since the outbreak of war, and played a large part in the Dunkirk evacuation.

* * *

So successful was Stationmaster Balmer's Advertising among the townsfolk of Pontefract of the arrival of the L.M.S.R. salvage film-unit that he obtained the record attendance one day recently of 1,140. Nearly 20 showings of the film were necessary. His request that each visitor should bring a used razor blade to help the L.M.S.R. contribution to the R.A.F. Benevolent Fund resulted in the remarkable collection of 10,000 blades.

* * *

Working Models Aid Swedish Charity

Little working representations in brass of Stephenson's *Rocket* have long done duty at some of our principal stations to raise money for benevolent purposes and at times substantial working models of high-class construction have been made to serve the same end. A typical example is the beautiful model of a North London passenger tank engine which used to stand at Broad Street terminus in London but is now in a place of safety. Very successful results have been achieved in Sweden by three models. One is of the early steam locomotive *Westergöthland* shown at Stockholm Central Station, with another of a modern ore-traffic electric locomotive. The third model, showing an express electric locomotive, is at Malmö Station. The insertion of a 10-öre piece sets a model in motion and the proceeds go to the State Railways' charitable guild, which benefited to the extent of nearly 5,000 kr. in 1942. The models belong to the Swedish railway museum. The full sized items are now housed in a covered space at Tomteboda.

* * *

Indian Railway "Questions"

Out of a total number of 1,063 questions asked in both the Houses of the Indian Legislature during the financial year 1941-42, no fewer than 317, or 29·8 per cent., were answered by the Government of India Railway Department.

* * *

A First Class Complex

It has been suggested in Parliament that although third class ticket holders are allowed to use the firsts if other accommodation is full, some Service travellers hesitate to do so when the firsts contain officers. As usual the implication was that this is one of the things about which something ought to be done, preferably, as we read between the lines of the report, by curbing the natural ferocity of officers. However, this aversion to riding in company with those in authority is a prejudice which it will be hard to eradicate. It begins with the schoolboy, who knows few embarrassments more acute than that of being closeted in a railway carriage with one of his masters out of term. Junior officers, too, shuffle and blush if a General enters their compartment, and it is even rumoured that the mirth and gossip of other ranks in the women's services may be stilled by the presence of one of their own officers. No doubt workers brought to the factory bench by the exigencies of war stand in similar awe of their chargehands. Even abolishing first class on the railways would not wholly solve the problem, which arises from a psychological complex rather than from any distinction made by the companies, who have never pretended to make the dividing line between their first and third class clients anything but commercial.

B. K. C.

Members of the staff of the Southern Railway at Orpington who recently assisted in raising £27 for the Merchant Navy Comforts Fund, by a raffle arranged by Mr. G. Cheal, Chief Clerk, London (East), Divisional Superintendent's Office. The chief helper, Inspector Ormond, is standing in front of the table; the two ladies are carriage-cleaners attached to the depot

* * *

Track Gauge

This is the distance between the rails of a railway or of a tramway.

In a railway it is the distance between the inner sides of the heads of the rails.

In a tramway it is the distance between the inside edges of the tread of the rails, *i.e.*, over and including the grooves.

Definition from the "Glossary of Terms used in Electrical Engineering."

* * *

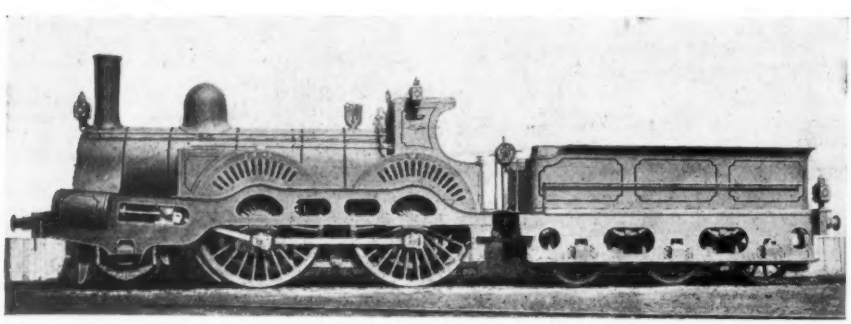
Bring Out Your Waste!

("We ought to collect more waste paper than we are getting. At present what we collect is providing 60 per cent. towards the materials used in the manufacture of paper in this country."—The Minister of Works)

Half the paper made and more
Now is got at dump and door,
Garnered from the salvage-minded.
Be you proud, but be not blinded,
Salvagers so staunch and tough!
Three-fifths made from salvaged stuff
Is not enough.

Every fragment, every rag,
Save and drop it in the bag,
For the sky's the limit set.
The more you save, the more you get.
Lords of scissors, ink, and paste,
Writers, readers, o make haste,
Bring out your waste!

E. C.



Dübs 2-4-0 express locomotive of 1874, Caledonian Railway

Cylinders 17½ in. × 24 in. Coupled wheels 7 ft. 2 in. dia. Boiler pressure 130 lb.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

CANADA

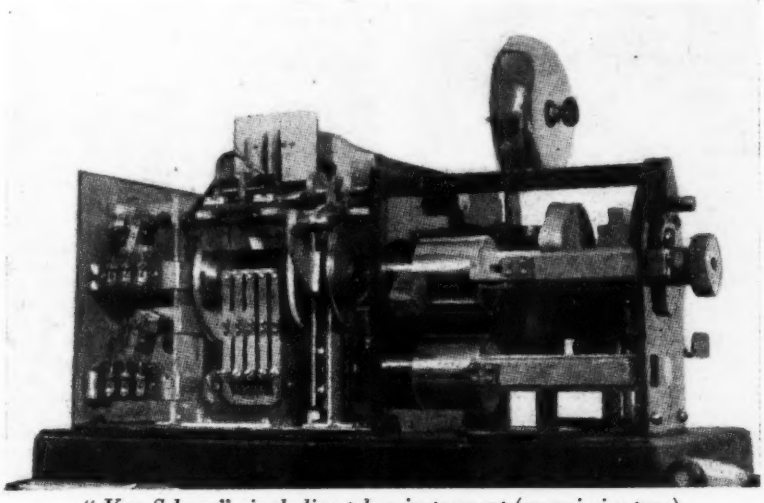
Effects of Agreed Charges

The Supreme Court of Canada has ruled that the Board of Transport Commissioners, in reaching a decision in cases when an agreed charge between a consignor and competing carriers has been presented for approval, is entitled to consider the effect of the agreement on the business and revenue of other carriers. The ruling was given after the Canadian National and Canadian Pacific Railways, with other competing rail carriers, had applied to the transport commissioners under the Transport Act for approval of agreed charges made by the rail carriers on certain specific traffic by two consignors, whose goods up to that time had been carried partly by rail and partly by water; Canada Steamship Lines Limited, which operates services on the Great Lakes and River St. Lawrence, had participated in the latter stage of the conveyance. The applications had been opposed by Canada Steamship Lines Limited, on the ground that the agreed charges would affect its revenue.

SOUTH AFRICA

New Train Token Instrument

The South African Railways & Harbours Administration has awarded a premium of £5,000 to Mr. M. C. van Schoor, who retired from the service in 1940, for his design, which it has adopted, of a single-line electro-mechanical train token instrument. He entered railway service at Cape Town in 1911, serving in various capacities in the electric lighting and telegraph & telephone departments, both in the Union and in former German South West Africa. In 1933 he turned his attention to improving the electric-token working, which had been introduced in South Africa in 1900, and he has developed since the instruments described as "electro-mechanical" and known by his name, of which there are three forms, the "absolute," the "permissive," and the "intermediate-crossing" instruments, corresponding to methods of working already extensively used for many years in the Union. The first cost and maintenance charges of the van Schoor equipment are said to be low, and the design to be characterised by simplicity and strength, with an absence of relays and local batteries. The number of electric contacts is stated to be few, and the forced drop-lock principle to have been embodied in the controls. The token magazine transfer system, has been adapted to the new apparatus, which has been tried with success, and presumably will be installed generally as opportunity serves.



"Van Schoor" single-line token instrument (permissive type)

UNITED STATES

New B. & O. Mallets

Among the 489 steam locomotives on order in 1943, of which details were given in our June 11 issue, are twenty large Mallets for the Baltimore & Ohio Railroad, the first articulated locomotives bought by this company for some years. Previous B. & O. engines of this type have been of the 2-8-8-0 wheel arrangement, but the new series will be 2-8-8-4s, with 5 ft. 4 in. (as compared with 4 ft. 10 in.) driving wheels, and considerably larger boilers, to give higher speeds and greater sustained horse-power, although the nominal tractive effort remains unchanged at 115,000 lb. The new locomotives will be permitted to operate over about one-sixth of the total B. & O. route-mileage of 6,000, but are intended particularly for the haulage of heavy coal trains over the severe grades in the Alleghenies between Fairmont, West Virginia, and Grafton and Cumberland, Maryland. They are being built by the Baldwin Locomotive Works.

Signalling Contracts

Centralised traffic-control is being installed by the St. Louis-San Francisco Railway over 47 miles of single track between Dillon and Swedeborg, Missouri. Two style "C" control machines are being installed at Newburg, in the centre of the section concerned, one to control seven locations east of that point, and the other seventeen locations to the west. The equipment includes searchlight signals, power switch-gear, and a certain number of electric locks on hand-thrown main-line switches. The contract is being carried out by the Union Switch & Signal Company.

The centralised traffic-control scheme of the Denver & Rio Grande Western Railroad over its Denver-Salt Lake City main line between Agate and Helper, Utah, referred to in a recent issue, is estimated to cost about $1,000,000.

Among other signalling contracts is one made by the Richmond Shipyard Railway with the General Railway Signal Company to furnish four automatic electric interlocking plants for the control of intersections of this line with branches of the Southern Pacific and the Atchison, Topeka & Santa Fe Railway System in Richmond, California. The R.S.R. is a rapid transit line which carries workers to the famous Kaiser shipbuilding yards.

CEYLON

Central Traffic Control

A central-traffic-control office for the Ceylon Government Railway is being established in Colombo. A system of centralised control was in operation some time ago, but was discontinued; its re-introduction will involve a certain amount of telephone installation, and the training of extra staff.

Road Passenger Services

The reorganisation of road passenger-transport services in Ceylon, to which frequent references have been made recently in the Overseas columns of *The Railway Gazette*, is nearly complete; and the majority of bus services in the island have been operating since January under the management of newly-formed limited-liability companies. The number of companies is 35, working together over 1,200 vehicles previously operated by about 750 individual owners.

SPAIN

Madrid Underground

The number of passengers conveyed over the lines of Compañia Metropolitano de Madrid in 1942 amounted to 258,000,000, compared with 220,000,000 in 1941. As the city has a population of approximately 1,100,000, the 1942 total means that every inhabitant averaged 234 journeys, or, in other words, the Underground conveyed daily about two-thirds of the population. Receipts averaged 126,300 pesetas a day, compared with 105,000 pesetas in 1941, and thus broke all previous records. Due to increases in wages and salaries, as well as in the cost of materials, expenditure rose to 29,100,000 pesetas, against 22,200,000 pesetas.

The increase in traffic continues in the current year, receipts for the first quarter of which exceeded by 11 per cent. the level attained in the corresponding period of 1942. Gross income in 1942 totalled 50,200,000 pesetas; expenditure aggregated 37,600,000 pesetas. A dividend of 6 per cent., in addition to a supplementary dividend of 3·59 per cent., was paid for 1942. An increase in the share capital from 133,000,000 pesetas to 198,000,000 pesetas was approved. The increase is connected with financing the extension of the company's system, totalling at present about 14 miles; work on the new line (Línea de los Bulevares) is stated to have progressed satisfactorily in spite of difficulties in obtaining materials; completion is expected early in 1944.

Transport in New South Wales

*Abstract of a paper by M. M. Allen, A.M.Inst.T., Hon. Secretary of New South Wales Centre of the Institute of Transport**

THE area of New South Wales is 309,433 sq. miles and the population is 2,800,000, being 10 per cent. of the area and 40 per cent. of the population of Australia. Road and rail transport in New South Wales is very much a Government affair and provides about 50,000 Government workers with employment. The promotion of railways commenced with the Sydney Railway Company in 1846, but, before completion of the first line in 1855, the Government took over the works, and decided to embark on the uncharted sea of Government ownership and operation of railways as a State-wide monopoly, adopting the standard gauge for all railways it would build. It was in 1855, also, that H.M. Government granted to New South Wales responsible Government, and, in so doing, handed over in fee simple as a gift the vast area of Crown lands in the State. The development of those Crown lands naturally became a dominating policy and railways were used as the main instrument for that development. The railways are now vested in, and under the sole control of, the Commissioner for Railways, who is responsible, through the Minister, to the New South Wales Government. Practically the whole of the railways have been built with British capital.

The tramways (311 miles) of the Metropolitan and Newcastle areas are owned and operated by the Government, which, in 1930, also commenced the acquisition of the main bus services. In 1941, tram passengers numbered 299,000,000, and Government bus passengers 80,000,000. The trams are to be gradually replaced by trolley-buses.

Transport Co-ordination Act

The Transport Co-ordination Act, 1931, imposed on common, contract, and ancillary carriers alike a tax of 3d. per capacity plus tare gross ton-mile on all road carrying for a distance greater than 20 miles (later extended to 50 miles) competitive with the railways, and a tax of 1d. per passenger mile in the case of competitive passenger carrying for any distance. As almost every mile of arterial road was in proximity to railways, this tax had the effect, so far as all long-distance traffic was concerned, of exclusively reserving the highways and trunk roads to the private motor-car. Since 1931, large sums have been spent on the highways and trunk roads, and it is difficult to reconcile this conflicting treatment of motor owners. To administer the 1931 Act the Department of Road Transport & Tramways was created, which drew on the public service for its staff, took over the tramways (formerly vested in the Railway Department), commenced the acquisition of the main bus services, and assumed the task of determining what was and what was not competitive carrying for the purpose of licensing vehicles and services. The Act vested the tramways and Government buses in the Commissioner for Road Transport & Tramways, who was given sole power to determine finally all applications for road operating licences and intra-state commercial licences except as to navigation and airworthiness of aeroplanes. The Government does not participate in civil aviation.

Highways

There are 5,178 miles of State highways, 2,371 miles of trunk roads, 9,458 miles of main roads, and 109,051 miles of other roads, making a total of 126,058 miles. In New South Wales, in 1939, there were 216,000 motor cars registered, 89,000 lorries, etc., and 23,000 motor cycles, a total of 328,000, equal to one vehicle to every nine persons, as compared with one vehicle to five persons in the U.S.A. and about one to 25 persons in the U.K.

The length of railways open is 6,127 route miles on the 4 ft. 8½ in. gauge: capital cost of open lines is £150,661,127, and the average cost per mile of line has been £24,600. Population per mile of railway is 461. Gross earnings in the year ended June 30, 1942, were £27,686,332, working expenses were £21,712,560, or 78·42 per cent. of gross earnings, and the profit on working was £5,973,772, which represented a return of £3 19s. 3d. per cent. on the capital expended on open lines. Passenger journeys during the year numbered 218,846,454 and the goods tonnage amounted to 17,854,519. There are 1,144 steam locomotives, 2,847 coaching vehicles (including 480 electric motor coaches), and 23,273 goods vehicles. The service rendered by the railways is confined to station to station carriage; they do not concern themselves with collection and delivery. Receipt and delivery at stations are effected between specified hours only.

Railway Accounts

In the early days of railways it was the practice to employ the double-account system under which the capital was kept in a capital account without any deduction for depreciation and obsolescence, except that on a complete renewal, the cost of the new machine or work was charged to capital and the book cost of the displaced plant was credited to capital. This system was supported by the contention that if railway property were fully maintained in good order there was no need to make provision for depreciation. British and American railways abandoned this practice many years ago and introduced adequate depreciation or renewal funds, without in any way disturbing the main principles of the double-account procedure. Adherence in New South Wales to the old idea resulted in an entire absence of renewal funds, and has no doubt had its effects on the rolling stock and equipment.

Locomotive Programme

The average age of the system's locomotives is high, but the Commissioner for Railways on August 20, 1942, announced that a great programme of complete renewals would be undertaken at the end of the war. British locomotive manufacturers might be of immense help to Australia if they established one or two local factories, and some steps to that end might well be taken on the initiative of the Australian Governments or of the locomotive manufacturers themselves. Even a well prepared catalogue and price list might start the ball rolling.

High Platforms and Side-Door Coaches

Originally, New South Wales adopted high platforms and side-door carriages and has retained that scheme which necessitates long stops at selected points for refreshment rooms, which are run by the Railway Department. In a sparsely populated country like Australia it would have paid the railways to change over to the American system of corridor coaches and low platforms. High platforms are expensive and retard the provision of additional stations as well as placing a limit on the length of trains.

Local Rates a Barrier

Each state in its "independent" days evolved its own rate structure and conditions of carriage without reference to any other state and the Federal Government (created 1901) has never taken any interest in railway rates. When traffic passes from state to state it is treated in each state as if it originated in that state; that is, there is "local" rating, which is a barrier much higher than the break-of-gauge barrier against a healthy flow of inter-state railway traffic, especially in the districts adjoining the state borders. Australia is suffering from the need of a trunk-line railway system, the only connections between the states being of the single-line description. Uniform rating would build up an inter-state traffic and thus give rise to an extension of the duplicated main lines towards the state borders and that, in turn, would give the state railways the opportunity to assist the Federal Government materially to carry out at least recommendation No. 1 of the Royal Commission in respect of gauge standardisation. As a war measure special rates on a uniform basis were introduced for "defence" traffic moving intra- and inter-state, and those rates might well form the basis for general uniformity.

Mr. Shiels, Engineer to the Sydney Railway Company in 1853, favoured the Irish gauge (5 ft. 3 in.) and the Governments of New South Wales, Victoria, and South Australia adopted it. Mr. Wallace, an Englishman (successor Engineer), had the gauge in New South Wales altered to 4 ft. 8½ in. in 1855, but Victoria and South Australia refused to change because of rolling stock commitments.

Sydney Suburban Traffic

The population of Sydney grew from 1,089,000 in 1925 to 1,350,000 in 1941, but in that period there was no increase in the average journey of passengers in the suburban area (within 34 miles of Sydney). In other words there was stagnation in the development of the outer suburbs. That stagnation was reflected in the middle and near suburbs, where in many instances extreme congestion arose. Three great metropolitan railway projects were taking shape in 1924, namely, electrification of the suburban railways (311 track miles), the underground city railway, and the Sydney Harbour Bridge. The first section of the city railway was opened in 1926; the second section opened concurrently with the Harbour Bridge in 1932; electrification was finished by 1929.

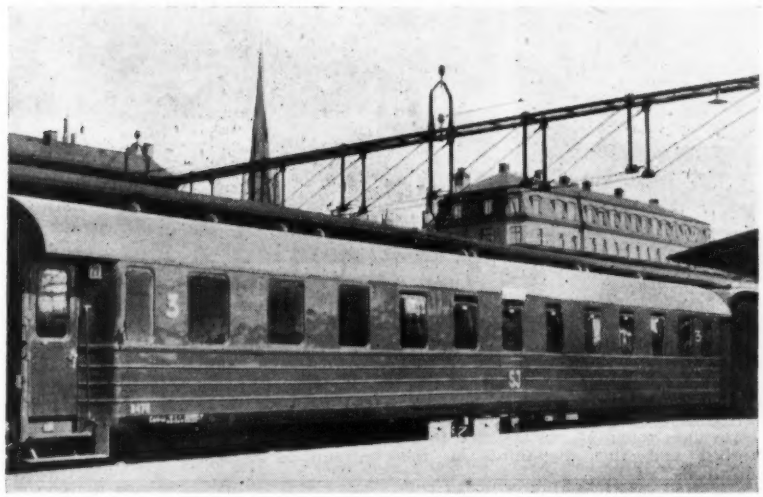
Air Navigation

The Federal Air Navigation Act has been ratified by the State Governments as uniform law in the general regulation of air navigation, air worthiness of aeroplanes, and licensing of pilots. It gives the Federal Government power to authorise interstate and overseas services. Each State Government retains its power to control intra-state competition; the power in New South Wales is vested in the Commissioner for Road Transport & Tramways by the 1931 Transport Co-ordination Act. While the Commissioner has not exercised his power to limit air services, the possession of that power has had a deterrent effect on prospective operators. At the time war broke out in 1939 a total of 101 aeroplanes was registered in New South Wales, and there were then 342 private and 116 commercial pilots. Most of the commercial flying in New South Wales was connected with overseas and interstate services.

*The full paper is published in the April issue of *The Journal of the Institute of Transport*

Progress on the Swedish State Railways

Swedish railways have been carrying steadily increasing passenger and goods traffic since the outbreak of war



All-steel welded third class coach on the Swedish State Railways

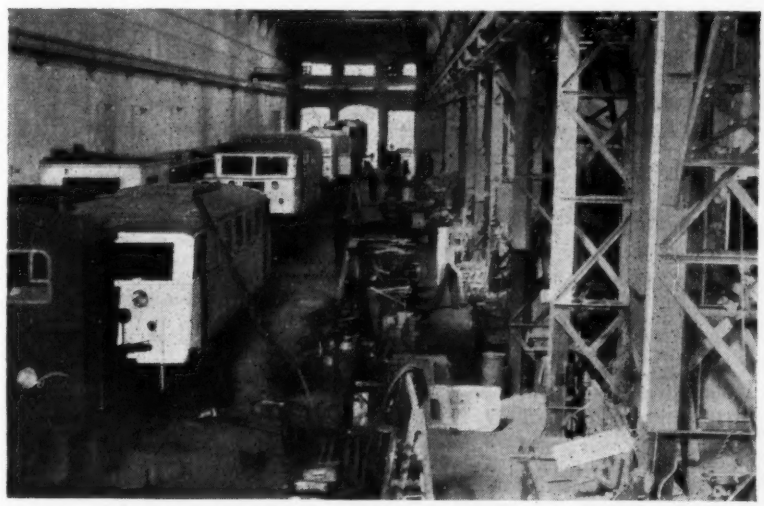
THE Swedish State Railways have issued an illustrated booklet describing the present position of the undertaking and containing approximate traffic figures for 1942. Like Switzerland, Sweden is surrounded by countries at war or occupied by belligerent forces and the whole economic life of the State has been seriously affected. Extensive defence measures have been taken to meet any threat to Sweden's neutrality. Although supplies of certain essentials have been much reduced, or even cut off, the transport system has had to meet ever-growing demands. The railways have proved themselves to be the mainstay of Sweden's general means of communication and to be essential to the functioning of both civil and military affairs. The publication in question has been issued with the object of explaining to the public what the railways have done and are being called on to do.

Military precautions alone have thrown a heavy burden on the railways, but other forms of traffic have also increased. New industries have been developed to meet the shortages threatened by the cutting off of imports, such as coal and certain chemical products. Large quantities of charcoal are being transported and producer gas is being increasingly used. Substitute foods for farm animals are much in demand. Goods traffic, which accounted for 2 milliard tonne-kilometres in 1938, the last full pre-war year, reached over 5 milliards in 1942. (The Lapland line ore traffic is not included in these figures.) A considerable amount of traffic has arisen from the transport of heavy electrical equipment such as transformers and large generating units, as special loads; bulk milk transport in tank wagons, or tanks placed on ordinary open wagons, has been heavy. The restrictions on motoring, as in other countries, have caused an unprecedented increase in bicycle traffic and about 2 million bicycles were carried on the railways in 1942. This is about ½ million more than the figure for 1941, itself 130 per cent. greater than the pre-war quantity. Passenger traffic for 1942 is estimated to have amounted to some 75 million persons, against 47 millions for 1938, which was itself thought a high figure. At present goods traffic is being given preference and this, combined with shortage of locomotives and materials, has necessitated the cancelling of a number of express and ordinary trains. The management is finding it advisable to place restrictions on special facility tickets, as the pressure on the available trains is very heavy. There is, of course, no tourist traffic now, but holiday traffic in Sweden itself has grown. Late running has much increased. The great amount of single track has contributed to increase delays arising from traffic irregularities, some of which originate in the special conditions now ruling. A shortage of staff compared with the actual requirements—the total number employed has risen from just under 30,000 in 1938 to 45,000—due to military demands, has helped to increase delays arising from defects or weather difficulties. Snowfalls were also particularly heavy during the last twelve months.

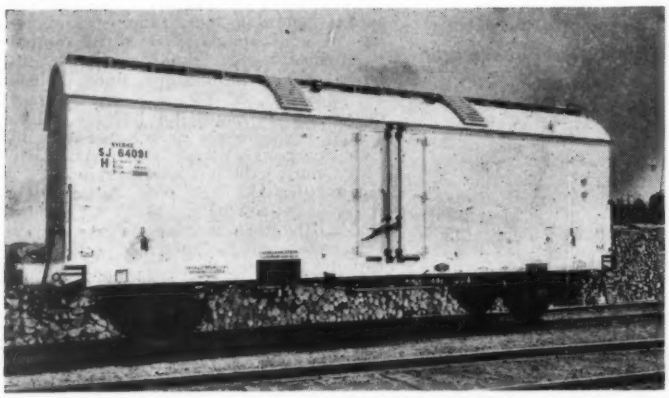
Electrification has been pushed forward. In February, 1942, it reached Boden, the then terminus of the electrified section in Lapland, so making a through electric route from Malmö to Narvik in Norway. Later the Gävle-Ockelbo and Ange—Sundsvall sections were converted and to date about 45 per cent. of the lines are worked electrically, conveying 85 per cent. of the total traffic. It is expected that the Hälsingborg—Hässleholm and Hälsingborg—Eslöv routes will be converted in the present year, and further extensions are being planned. The war has emphasised the necessity for making the railway system totally independent of imported fuel. The latest electric express locomotives, known as type F, were illustrated in THE RAILWAY GAZETTE for June 26, 1942, page 699.

A number of bridges has been strengthened, certain sections of track doubled, several stations rebuilt, and marshalling yards enlarged. On the single lines passing loops are being lengthened. Special loading machinery has been installed for handling mass consignments, as in the case of the beet traffic. Extensions of power and automatic colour light signalling have been put in hand. Air raid shelters have been provided at stations, fire fighting equipment installed, and blackout arrangements made. Blackout exercises with the staff, and also with the public, have been carried out. Additional goods and passenger rolling stock has been obtained, including some all-steel welded coaches and bogie railcars. The State Railways bus services, all worked on producer gas, now cover 7,600 km. (4,723 miles) of route. Substitute materials are being increasingly used in rolling stock maintenance.

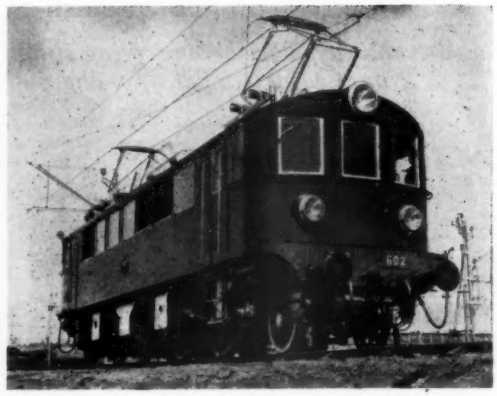
After discussions which began several



Interior view of a Swedish State Railways workshop



Refrigerator van for foodstuff conveyance



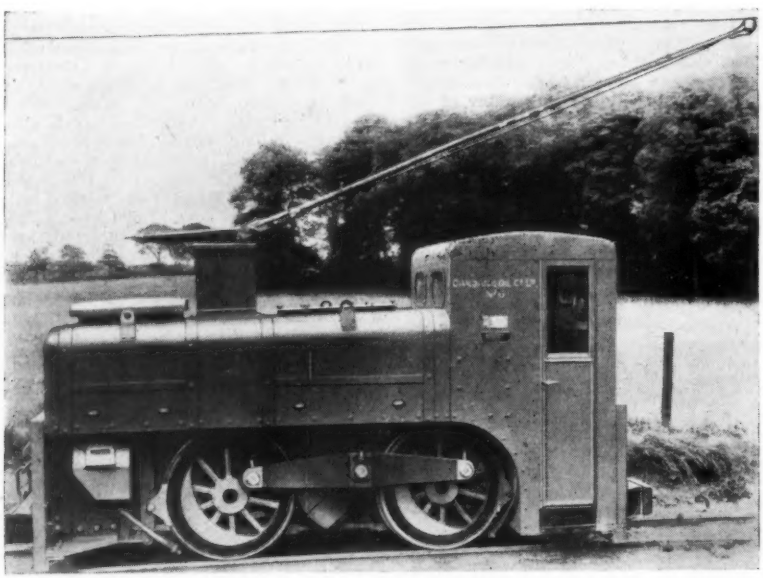
Latest type of single-phase electric locomotive

years ago, the Swedish Parliament decided in 1939 that all standard- and narrow-gauge privately-owned railways, save a few of purely local importance, should be acquired by the State and in June of that year the State Railways management received instructions to take the necessary measures. Already some 30 lines have been taken over, with a total length of about 2,500 km. (1,554 miles). Among these are the Gothenburg—Växjö—Karlskrona, Varberg—Borås—Uddevalla, the Hälsingborgs, Landskrona, Kalmar, Blekinge, and other lines. The private lines round Malmö are now to be absorbed and then two-thirds of the country's railway system will be under one management. Its total length now exceeds 11,000 km. (6,834 miles).

Women are being employed on an increasing scale in the present emergency. Increasing attention is being given to staff training and the selection of new entrants to the service.

A Narrow-Gauge Shunting Locomotive

The 2 ft. 6 in. gauge calls for unusual driving arrangements in an electric shunter



BRIEF mention was made on page 145 of our February 5 issue of two 12-ton electric shunting locomotives built by the Metropolitan Vickers Electrical Co. Ltd. for operating at an oil refinery on a private 2 ft. 6 in. gauge railway. An illustration was given showing the locomotives at work in a siding. Accompanying this article is a further illustration showing one of these interesting units in greater detail.

Due to the narrowness of the gauge, a conventional driving arrangement employing an axle-mounted motor could not be accommodated; consequently a special design of drive, which is sometimes termed the "Scotch Yoke" drive, has been adopted. A single traction motor is rigidly mounted in a transverse direction on the locomotive framing and this drives a jackshaft through double-reduction gearing. Cranks at the extremities of the jackshaft actuate side beams which are in the form of coupling rods between the wheels. The gearing with all necessary bearings forms a totally enclosed unit. The bearings provided at the centre of the side beams to take the jackshaft cranks are constructed to allow for vertical movement of the axles in relation to the jackshaft; this movement disturbs the alignment of the three centres. The motor, which is supplied with d.c. at 500 to 550 v., has a nominal rating of 72 h.p. at the lower voltage. The total gear reduction is 18 to 1; the driving wheels are of 36 in. dia.

The usual load of the locomotive is a train of 30 tubs which totals about 65 tons. With this load the maximum speed on the level is 8 m.p.h.; up the steepest gradient, which is 1 in 48, a speed of 6 m.p.h. is maintained. The maximum speed under any condition is limited to 14 m.p.h.

Control is effected by a drum-type controller with nine notches in both forward and reverse, so that a smooth start is obtained with any normal load. Handbrakes and sanding arrangements are provided.

LOCOMOTIVE TESTING.—Track tests on locomotives yield very little data of scientific value unless the load can be kept constant at required values for definite periods of time. An ordinary train imposes a varying load on the locomotive due to variations in track gradient and speed; consequently the drawbar pull as shown by a dynamometer car is continually fluctuating. To overcome this difficulty engineers abroad have substituted one or more locomotives set to run in back gear for the more usual type of test train. By regulating the valve gear setting of these brake locomotives it is possible to adjust the effort required at the drawbar to any desired figure irrespective of gradient or speed. This method of trial has been employed on the L.N.E.R. and a paper on the subject was read recently before the Institution of Locomotive Engineers by Mr. T. Robson. During the discussion, Mr. E. S. Cox explained that a brake vehicle made to resemble an electric locomotive, but with the motors intended to act as dynamos, would give greater facility in load control than a reversed steam locomotive.

The Railways of Haiti and San Domingo

This Caribbean island contains two separate republics, each with small narrow-gauge public railway systems

THE Republic of Haiti, with an area of 10,204 square miles and a population estimated at 3,000,000, forms the western third of the island of Haiti. Transport facilities are afforded by the numerous rivers and roads, and the railway system is limited to two relatively short lines, the National Railway Company, with about 110 miles of main line on the 3 ft. 6 in. gauge; and the Plain of the Cul-de-Sac Railway, with 55 miles of main line and 9 miles of sidings on the 2 ft. 6 in. gauge. There is also a small mileage of industrial or plantation narrow-gauge railways, mainly for the transport of sugarcane and fruit. The National Railway (Compagnie Nationale des Chemins de fer D'Haiti) dates from 1905, when the company took over from the Republic the half-finished Chemin de fer du Nord. Financial difficulties delayed construction, but the line had been practically completed when the revolution of 1911 and subsequent internal disorders led to the destruction of much of the company's property. Eventually a receiver was appointed, and the Government came to the rescue in 1920 with a loan of $2,660,000. The railway is operated in three divisions: Port au Prince to St. Marc, 65 miles; Cape Haitien to Bahon, 24 miles; and Gonaives to Ennery, 21 miles. The Plain of the Cul-de-Sac Railway (Cie. des Chemins de fer de la Plaine du Cul-de-Sac) extends from Leogane, through the capital (Port au Prince), to Manville, and is principally a carrier for the large sugar companies near Port-au-Prince.

The Dominican Republic, commonly called Santo Domingo, or San Domingo, occupies the eastern portion of the island of Haiti, which lies between Cuba and Porto Rico. The area of the Republic is 19,322 square miles, and its population is 1,581,248. The system of public service railways is limited to two relatively short lines, and the bulk of the produce of the country, consisting of fruit and sugar products, is transported on private industrial and plantation railways. Both the public service railways are now owned and worked by the Government. The Central Dominican Railway, or Ferrocarril Central Dominicano dates from 1890, and has always been a State concern. The original project was for a railway to cross the country from Puerto Plata, on the north coast, to Santo Domingo or Ciudad Trujillo, the capital, on the south. The scheme originated in 1890, and rails reached Santiago in 1897. The line was operated by the Santo Domingo Improvement Company until 1908, when the company's interest was acquired by the Government and the line was completed to the present terminus at Moca. The other public service railway is known as the Samana-Santiago Railway, and the original concession was granted to a Scottish company in 1881. The project was for a line from Samana to Santiago, but construction difficulties were experienced and the line ended when rails reached La Vega in 1886. It was extended to Moca in 1917, and a branch was built to Macoris; the Macoris line was a separate undertaking. The company's revenues declined of late years and the Government took over the line; the company went into liquidation in 1942. The Dominican public railway system may now, therefore, be tabulated as follows :—

Dominican Government Railways : (Ferrocarril Unido Dominicano)	Gauge	Mileage
Sanchez-Moca Section (Samana-Santiago Railway)	3 ft. 6 in.	87
Puerto Plata-Moca Section	2 ft. 6 in.	62
		149

The greater part of the produce of the country, as explained above, is transported on private industrial and plantation railways. Of these, there are about 20 in operation, of various gauges (mostly 2 ft. 6 in.), and aggregating some 660 miles in length.

Southern Railway "Q 1" class locomotive No. C6 hauling a Reading to Redhill passenger train

Photo] [*H. M. Madgwick*

Tractive Effort and Wheel Diameter

Some advantages which may be derived from the use of large diameter driving wheels

By W. A. Tuplin, D.Sc., M.I.Mech.E.

THE "nominal tractive effort" of a steam locomotive is arbitrarily defined as the work done by the steam on the pistons during one revolution of the driving wheels, divided by the circumference of the driving wheels, when the mean effective pressure in the cylinders is equal to 85 per cent. of the working pressure of the boiler. It is equal to the mean force that would be developed at the tread of the driving wheels during one revolution, if all friction were eliminated. It may be desirable to emphasise that the "85 per cent." is an arbitrary figure representative of the mean effective pressure in the cylinders of an average steam locomotive when working in full gear, that is, with steam supply to the cylinders cut off at about 75 per cent. of the stroke. The "85 per cent." does not envisage any drop of pressure between boiler and steam chest; a very low running speed is assumed, with cylinder pressure at cut-off equal to the full working pressure of the boiler.

Significance of Nominal Tractive Effort

It is natural to assume that tractive effort is some indication of the ability of the locomotive to haul trains, and when, between 1922 and 1927, three of the British railways produced main-line locomotives with progressively increasing nominal tractive efforts, popular interest tacitly accepted this figure as a measure of power. It is easy to see, however, that nominal tractive effort (n.t.e.) has no such wide significance because

(*a*) it does not necessarily indicate even the maximum pull that the locomotive can exert, as that is limited by adhesion weight, and

(*b*) it does not indicate the sustained power capacity of the locomotive, first because that must depend on the capacity of its boiler to produce steam, and secondly because, by its definition, n.t.e. corresponds to pressure conditions that can apply only at very low speeds.

Does the n.t.e. figure offer any information at all about the possible performance of the locomotive when sustaining a normal running speed? In reply, it can be said that it gives an indication of the efficiency with which the locomotive may use the steam supplied to its cylinders. The ratio of the tractive effort required for a certain haulage condition to the n.t.e. of the locomotive is the ratio of the necessary mean effective pressure to 85 per cent. of the boiler pressure. The greater the n.t.e. the lower is the ratio of necessary m.e.p. to boiler pressure, or, in other words, the higher may be the ratio of expansion of steam in the cylinders. If two locomotives are doing the same work, the one with the higher n.t.e. may be expected to show the higher cylinder efficiency.

The statement is subject to some qualification. It assumes, for example, that valve events and superheat of the steam are such as to permit the engine to work with full boiler pressure in the cylinder at the beginning of each stroke and to secure efficient expansion and exhaust of steam. Improvements in these respects have changed our notions of what is a practicable expansion ratio and therefore of what is a suitable relation between the dimensions of boiler and cylinders. In the past, engines that seemed by dimensions to be "over-cylindered" have had difficulty in maintaining steam pressure on the road; on the other hand, later locomotives whose dimensions suggested the same defect in even worse degree have nevertheless worked quite well, because they are able to use suitably high expansion ratios.

Broadly then, the power of a locomotive depends first on its ability to generate steam and secondly on its ability to use it efficiently. The n.t.e. figure is an indication of what may be expected of it in the second respect, assuming that its design is such as to permit it to work with high expansion ratios.

Although the considerations outlined above suggest that the n.t.e. should be as high as possible there are limitations imposed by:

(*a*) adhesion weight, and

(*b*) practicable upper limit of expansion ratio in single-expansion engines with conventional valves and valve gear.

The higher the ratio of n.t.e. to adhesion weight the more likely will be the engine to slip when starting. The disadvantage can be discounted by sufficiently careful handling, which may mean that the actual tractive effort developed by the engine never reaches the n.t.e. figure. This, however, is not a criticism of high n.t.e.; if when starting or accelerating at low speed the tractive effort is allowed to approach the slipping point, which is defined by the adhesion weight, that is all that can be expected, and the fact that the n.t.e. may be much higher than the slipping limit is no detriment except insofar as it calls for special care on the part of the driver.

The usual practice is to control starting effort by throttling the steam through a small regulator opening that can be quickly closed if a slip should start, but this is not entirely effective in a large engine that is prone to slipping, because the large volume of steam in the superheater and other steam pipes prohibits quick reduction of steam-chest pressure. In some cases the problem has been tackled by adopting the unusual course of starting at an early cut off (about 20 per cent.) and *advancing* this as the speed rises to about 30 m.p.h., before finally "notching up" in the usual way to an early cut-off at full speed.

Referring to (*b*) above, the expansion ratio cannot conveniently exceed about 5 to 1, and in practice 4 to 1 (which means cut-off at about 15 per cent. of the stroke) is more nearly representative of the most successful modern British practice. This may correspond to a m.e.p. equal to (say) 30 per cent. of the boiler pressure and if the locomotive is to develop a particular tractive effort at this cut-off position, which might be suitable for normal load at full speed on the level, then the n.t.e. would have to be that figure divided by 30 and multiplied by 85.

It is necessary to check that this n.t.e., which is the greatest that the locomotive can be expected to develop, is sufficient to overcome friction and gravity in starting engine and train on the steepest adverse gradient that they will encounter. The adhesion weight must also be large enough to ensure that the tractive effort necessary for this purpose can be transmitted to the rails by friction.

Wheel Diameter

For a given boiler pressure, n.t.e. is proportional to cylinder volume divided by diameter of driving wheels. Consequently, any desired n.t.e. may be obtained either by large cylinders and large wheels or small cylinders and small wheels. An upper limit is set to wheel diameter by the loading gauge and the size of the boiler and (if more than two axles have to be coupled) by the permissible rigid wheel base. Small wheels have the disadvantage of high speed of rotation involving high rubbing speed for the pistons and (in a 2-cylinder engine particularly) heavy hammer-blow on the track, and this despite the offsetting influence of small cylinders.

Large wheels increase the unsprung weight on the track, although this is usually more than offset by the reduction in hammer-blow associated with the lower speed of rotation, and they do not appear to have any other disadvantage. It may therefore be suggested that the wheel diameter should be as large as can be arranged beneath the boiler necessary for the power output required.

It will be noticed that although there is an objection to the use of small wheels for high speeds, there is no objection to the use of large wheels (unless they restrict boiler diameter) at either high speeds or low speeds. In other words, the large wheel can meet both conditions, but it would seem that advantage is not usually taken of this fact.

It has long been a practice to build "mixed-traffic" or "fast-freight" locomotives with driving wheels smaller than those used on express passenger locomotives. It is true that the lower speeds at which the former class normally work *permit* the use of smaller wheels but it is wrong to assume (as appears to have been assumed) that lower speeds *demand* smaller wheels. It is true that a reduction in wheel diameter without change in cylinder volume produces a greater tractive effort, but this result can be equally well achieved by retaining the large wheel and increasing the size of the cylinders. The advantage of this course is that the large-wheel engine can do all that the "mixed-traffic" engine can do and is at the same time more suitable for high speeds when required.

For example, a G.W.R. "Saint" fitted with cylinders of 20·1 in. dia. (instead of 18½ in.) would have the same tractive effort as a "Grange" which differs from the standard "Saint" only in wheel diameter. It would not be inferior in any way to the "Grange" or to the intermediate "Hall" and would be (as at present) a faster machine than either of them. At any given speed it is (and would be) easier on the track and on itself than its smaller-wheel rivals.

In the rather distant past the adoption of boilers too large in diameter to be placed between the wheels, and the reluct-

ance to adopt what were considered as high centres of gravity, persuaded designers to use smaller wheel diameters. From the 7 ft. 6 in. to 8 ft. range, which was used in "single-driver" days, we have fallen to the 6 ft. 6 in. to 6 ft. 9 in. range for modern high-speed engines. Only in the case of the largest locomotives has this been imperative and the fact that the L.M.S.R. "Coronation" accommodates a 6 ft. 5½ in. boiler on 6 ft. 9 in. wheels, shows that 7 ft. 2 in. wheels could be used under any boiler not exceeding 6 ft. dia. In other words, if Pacifics and 2-6-2s be excluded, there is no standard locomotive in this country that is prohibited by a height restriction of 13 ft. 2 in. from having 7 ft. 2 in. wheels.

This is a somewhat startling reflection. The immediate objection that occurs to one is that the boilers would in many cases be highly pitched and in the past the height of the centre of gravity would certainly have been deemed a bar to the adoption of these proposals, but now that so many American high-speed locomotives work successfully with boilers placed higher than even 7 ft. 2 in. wheels and a 6 ft. barrel would require, the objection on the score of high centre of gravity cannot be very strongly urged.

Six-coupled wheels 7 ft. 3 in. dia. could be accommodated in a rigid wheel base of 15 ft. (which is about the average for British 4-6-0 locomotives) without coming down to the low record of flange clearance established by the Ivatt Atlantics.

An L.M.S.R. Class 5, 4-6-0 with "Coronation" boiler mountings could have 7 ft. 3 in. wheels and still stand within a height of 13 ft. With cylinders 19·7 in. dia. by 30 in. stroke, its tractive effort would be the same as at present and, incidentally, the cylinders could be set horizontally. The weight of the reciprocating parts would be somewhat increased, although the heaviest members (the connecting rods), being probably more severely stressed by inertia forces than by thrust load, might not need altering. The engine would be in no way inferior to the present standard one and would be very distinctly lighter on the track at high speed. It would deliver 17 per cent. fewer hammer-blows per mile of track, and at any given speed the blows would be about 22 per cent. lighter, and the piston speed 11 per cent. lower. It would, of course, be capable of even higher speeds than the standard engines, lively though they are, and so it would be even more versatile than they.

In face of the traditional use of small wheels for low speeds it is rather hard to believe that large wheels could equally well be used. Possibly reluctance to accept this view is associated with the fact that the slow beats of a large-wheel engine in accelerating from rest tend to give an impression of sluggishness, but this is illusory. Acceleration is decided by tractive effort, which (if the cylinders are large enough) is limited only by adhesion weight, and wheel diameter does not affect the matter.

The dimension of 7 ft. 3 in. calls attention, by a coincidence, to the L. & Y.R. Aspinall Atlantics, which had driving wheels of this diameter. They were built for use on one of the hardest roads in the country, and such large wheels seemed inappropriate for the moderate speeds and heavy pulling that characterised much of their work. Nevertheless the engines were multiplied and, judging by the fact that they continued in service for over thirty years, were completely successful. They afford evidence in support of the view that the large wheels that are admittedly advantageous at high speeds, suffer from no serious disability in other running conditions, and therefore that any engine that may have to run fast should be provided with the largest possible driving wheels.

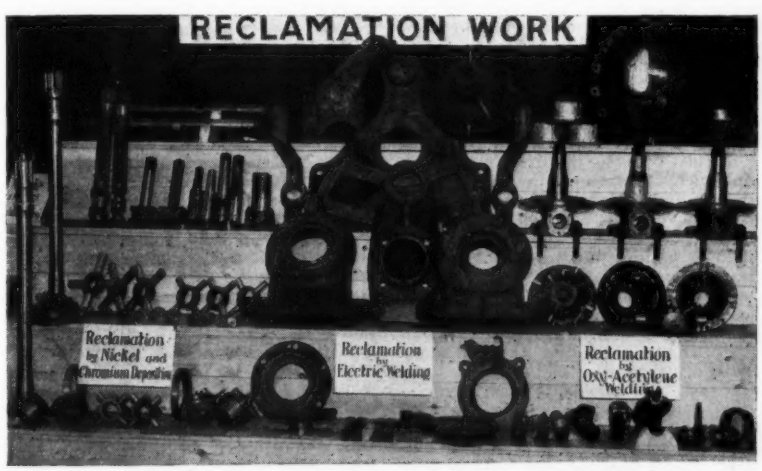
Reclamation of Engineering Materials

IN 1933, the London Passenger Transport Board introduced up-to-date material reclamation methods at its new Lillie Bridge permanent way depot. Serviceable engineering material from all parts of the board's railway system is taken there or to a depot at Neasden. From the latter, anything suitable for further use is reissued, but anything considered at Neasden to be scrap is sent to Lillie Bridge, at which place a complete sorting and grading of every item received is effected by qualified staff. The procedure has been intensified since the war began and covers a great variety of material. Rails removed from the track, for example, are separated into those suitable for use in sidings, and those which can be treated to render them again serviceable in main lines. Old sleepers are sorted and graded, screw spike holes plugged, and chairs examined to see which can be re-used in sidings. Used fish-bolts frequently have the nuts re-run on them after the threads have been cleaned, and are again employed in sidings. Many items of signalling equipment are also dealt with at the depot. When an installation is modernised, a good deal of apparatus is recovered. After inspection, and possibly a little renovation, this is capable of an appreciable useful life on sections of the line where older apparatus is still functioning. So well-built was this old equipment that an extraordinarily long life is being obtained from it.

When a length of cable is renewed, any faulty portion is cut out and the sound lengths stored. On a piece being required, the nearest reclaimed length is taken, to avoid cutting a longer one. The lead covering and copper core of actual scrap cable go towards new cable or munitions. The paper insulation is also valuable, and rubber sheathing can be melted down. When it can be seen on the site that a piece of removed cable is scrap, it is disposed of without being sent to a depot. These remarks also apply to cable recovered in the tram and trolleybus services. On the conduit tramways, the heavy cast-iron yokes holding the running and slot rails are a costly item and consume valuable material. Yokes are now being made out of steel joists taken from buildings and structures demolished in the air raids. A considerable amount of piping, originally supplying water to new works headings in tube railways, has been used as railings on roofs to safeguard fire-watchers, as stop sign supports on trolleybus routes, and roof supports in temporary buildings.

At the Acton railway works, the most important item in the salvage drive is making scrap car axles into miscellaneous forgings to serve for locomotives being built in another part of the country. Used files are re-cut, and bolts and nuts rethreaded by specially installed plant. Electro-plating is resorted to for bringing worn parts up to size. Cutting tools and milling cutters are annealed and re-cut to a smaller size, while, in the manufacture of all new cutting tools, alloy steel heads are welded to mild steel shanks. Copper tips and segments from electrical control gear are re-profiled. Terminals are recovered from exhausted dry cells and the caps of failed electric lamps are returned to the manufacturers. All scrap nickel and tungsten is collected, together with waste material of every kind, however unimportant it might seem, such as pieces of string and rope.

Periodical inspection of premises ensures that nothing is overlooked. The waste oil from machines is used for rail lubricating boxes on track curves, which themselves produce a saving of many tons of rail and tyre steel annually and are one of the most welcome improvements of recent years. Oil recovered from items of electrical equipment is re-used in the shops for various purposes, but any which is too thick and heavy to serve is burned as fuel under boilers. Small electrical parts are now made up by welding, etc., when worn. Fuse boxes, for example, have new hinges fitted to them instead of being thrown away as formerly. Resistance plates are being welded up and the cracks in arc spacers are being filled up with arc-resisting cement.


RECLAMATION WORK
Reclamation by Nickel and Chromium Deposition
Reclamation by Electric Welding
Reclamation by Oxy-Acetylene Welding

Typical components reclaimed by electro-deposition

The Train Dispatching System in America

Operating conditions on U.S.A. railways where there is a very large mileage of single line, resulted in the Train Dispatching System and its development into the "Standard Code"

EXCEPT in the immediate vicinity of the larger centres of population, conditions under which railways were developed in the United States and Canada were so different from those in Great Britain, and a large proportion of the European Continent, that the interlocking and block-working arrangements widely adopted on this side of the Atlantic could find only a limited field of usefulness in America. For a long time single-line working was almost everywhere the rule and even now it predominates. The long distances between the principal towns and junctions, made necessary crossing places at small stations, or between stations, to accommodate the traffic which might be comparatively heavy at times. The train-staff, and ticket, and electric-token systems were not easily applied on these lines, although the great advantages of the latter were recognised and they found limited, but successful, application on some railways. When the principle of the block system was adopted, it was usually applied by means of Morse telegraph messages and manually-worked signals, or later by using automatic signals. On some of the financially stronger lines on the eastern side of America a certain amount of lock-and-block was used and this afterwards found favour on a few single-line routes, but most railways had to rely on cheaper and simpler methods of conducting their traffic. From these circumstances arose the train dispatching system.

The Origin of Train Dispatching

In principle, train dispatching was not an American idea, as the use of the telegraph to regulate single-line traffic was proposed, and applied, by W. F. Cooke in England before it was used in America, but single lines were of much less consequence relatively in Great Britain. American railways had at first to rely on strict observance of the order of movement prescribed in the timetables to secure safety on the single lines. The inconvenience of this needs no emphasis, and it is said that the first departure from it was made in 1851 by Charles Minot, Superintendent of the Erie Railroad, who sent a message from a station called Turner (now Harriman) directing another station to hold a train against the printed arrangements and allow his to proceed, to expedite the traffic. A monument, placed at this station in 1912, commemorates the sending of this, possibly the first, telegraphic train order. The use of the telegraph to vary the timetable precedence of trains very soon became common practice in America and in time a regular codified system of working by this means, named "train dispatching," was built up and is still in general use. This was done when, on most railways, there was practically no signalling, as understood in Great Britain. At first the numerous railway companies had their own methods of issuing train orders, giving hand flag, lamp, and whistle signals, and working the few fixed signals as seemed required, but the lack of uniformity made itself felt and efforts were directed towards securing agreement on at least fundamental principles, just as an agreement on the zone time system was also reached. Accurate timepieces were essential to trainmen working under the dispatching system, as serious results might be the outcome of error in times. The use of standard clocks at stated points and the regular inspection of watches was a necessary element. The Association of American Railroads—known for many years as the American Railway Association—played an influential part in standardising operating rules, and numerous conferences of superintendents and train dispatchers also contributed to the result. Standardisation in every detail was not possible, because the requirements of some lines were different from those of others and the rule books of the various railways are not therefore identical, but there is what is called a "Standard Code of Train Rules," on which all parties to the association base their practice. This code has been evolved over a long period. Within thirty years of the sending of Minot's telegram its foundations were fairly well laid and there has been no radical change since in essentials.

Essentials of the Dispatching System

The fundamental element of the dispatching system is the timetable, issued over the authority of the superintendent, containing the schedules of all regular trains and providing for their safe working. There is a distinction between regular trains, which possess authority in themselves to use the track, and extras which possess none, have no schedule, and can run only under train orders. On many lines all goods trains are extras. These orders are issued by a dispatcher who has jurisdiction over a specified area, with the superintendent's authority. He is in communication with operators at the various stations by telephone or telegraph (originally telegraph alone was used for this purpose). The various classes of trains are given what practically amounts to rank; that is to say some are said to be superior to others by their class. If two trains travelling in opposite directions on a single line are of equal class, one of them will be superior to the other by reason of its direction. If the dispatcher changes any of the timetable arrangements by order, he confers what is called "right" on certain trains and this makes them superior to certain others, but only within the terms of his orders.

There is therefore a traffic precedence accorded to the trains, in the first place by their schedules and direction, as shown in the timetable, then varied as occasion demands by train orders. These orders are issued in about twelve set forms of language, duly laid down to meet various contingencies. There are two principal train-order forms, called the "19" and "31"; the latter requires the signatures of trainmen to it, duly notified to the dispatcher, before it is "complete," that is, before it can come into force. It cannot therefore be handed to a train in motion, whereas the "19" form of order usually can. On some lines where there is track-circuit signalling, only one form is used, equivalent to the "19." Once a train-order is in effect it remains so until it is carried out, or properly superseded or annulled, and may not be ignored. The passage of all trains is notified by the operators to the dispatcher and he records the information on a train sheet, from which he decides what steps, if any, are necessary to conduct the traffic. Arrangements for all extras—which are in themselves inferior to regular trains—have to be made by him. At selected stations what are called "train registers" are kept, in which train arrivals and departures are recorded, and it is the duty of train crews to examine these before leaving these places to ascertain if all superior trains due are accounted for. All trains are numbered in the timetable and frequently carry their number (lighted at night) on an indicator on each side of the head lamp. Extra trains are designated by the locomotive number, similarly carried, with the letter X before it. If it becomes necessary to run a regular train in more than one portion, the portions—known as sections—are called "First 24," "Second 24," and so on. Each has exactly the same authority to use the track as the first has, unless the dispatcher otherwise orders. All trains exhibit the well-known headlight in front at night, but this has to be concealed when a train has turned out to meet another, or is standing to meet trains at the end of the double track or at junctions. Extra trains carry two white flags on the engine by day, and at night two white lights in addition, one on each side of the smokebox. Some lines do not carry white flags at any time on extras but depend on the number indication; the white lights are carried at night. When a train is run in more than one portion all sections of it, except the last, carry two green flags by day and at night two green lights similarly located. This is known as "displaying signals for a following section," or more shortly "displaying signals." (One white or green light means the same as two, but the carrying of two is positively required by the rules. On double-headed trains both locomotives carry these special signals.)

The tail signals, called markers, consist of two green flags by day, and by night two lanterns showing green to the front and side and red to the rear. (Yellow flags and lights are used instead of green as markers by some lines.) When a train has taken a siding to be passed by another, and the points have been set for the latter, the red tail lights are changed to green (or yellow). On some lines unlighted lamps are carried instead of flags as day markers and it is permissible, if a railway so desires, to run passenger trains without day markers. The Standard Code contains an agreed set of steam-whistle signals and air-whistle signals, for communication between guard and driver, as well as hand-flag and lamp signals. The latter are usually given by various movements of a white lantern of the hurricane type, but a red lamp is, of course, generally used as a stop signal. Green (or yellow) is the caution colour. Blue indicates that a vehicle must not be moved. To stop a train at a "flag station" green and white are displayed together.

The governing idea of the dispatching system is that a superior train has the right of way and inferior trains must therefore keep off its schedule. This means that a superior train has the right to proceed against those inferior to it as long as its schedule is in force. (As soon

as a train becomes twelve hours late it loses all its authority derived from the timetable and can run thereafter only on train order, like an extra. Any orders it holds at the time likewise become void.) The effect of this principle is this. If a train is marked in the timetable to meet another superior to it, for whatever reason, at, say, B, on reaching A, the station in rear, it must not proceed unless it has its full running time to B plus a certain stipulated margin, enabling it to clear the schedule of the other train by a sufficient interval. Failing this it must remain at A. The superior train is fully entitled to come on, approaching all crossing places with caution, until the inferior train is met. (It may obviously be necessary for a late inferior train to wait more than one station short of the prescribed crossing station.) If, however, the inferior train duly reaches B to time, but the superior train does not appear, it must, unless it gets a train order to do otherwise, wait there until the meet is effected. If the superior train is found "displaying signals" the inferior one must also wait for the "section" so announced and if that carries green signals it must wait for another such section, and so on, as all sections are equivalent to the leading one. (A special whistle signal has to be sounded by the driver to call the attention of the men on an opposing train to his green signals and if this is not properly acknowledged he is required to stop. Another whistle signal is given on approaching a meeting point with a train of the same or superior class.) In the case of following movements, an inferior train must keep clear in like manner of the schedule of a superior one timed to overtake it, and is usually required to be clear of the main line by the time a "first class" train is shown as due to leave the station in rear. The definition of "station" is wide and does not necessarily mean one in the public sense. It is clear that a train may leave a crossing place with sufficient time to make the next one according to rule and, say, break down. The time margin, however, enables it to protect itself and any superior train which, not finding the inferior at the expected place, proceeds as entitled must be prepared for this contingency. Very strict rules govern the protection of trains by flagmen and when a train cannot make its time and is liable to be overtaken, lighted "fusee" (flare) signals are thrown off in rear at intervals.

Function of the Dispatcher

The function of the dispatcher is to conduct the traffic with the maximum expedition and safety and the least possible departure from the regular schedules. If the information reaching him from the operators shows it to be necessary or advisable he issues train orders, the effect of which is to vary the precedence laid down for the trains by timetable. He can hold a train back, or send one forward, or order a train to run late and so on, as he sees fit. Whatever "rights" he so confers on a train possess absolute authority and nobody else can weaken it. If, for example, he says that a train is to run so many hours late he alters its "schedule" by that amount and inferior trains must then run with respect to the new timing exactly as they would have done to the old. The superior train must adhere to the new timing, at least to the extent that it may not gain on it. No train may at any time arrive at a place in advance of its schedule, whether established by timetable, or made later by order. This is obviously essential, to enable inferior trains to clear the track correctly for it. The dispatcher can reverse the relative "rank" of two trains, making the inferior one superior, for a certain distance. He can vary the meeting points and do anything within the rules of the Standard Code that he thinks will move the traffic to the best advantage. The operators are furnished with so-called "train order signals" (usually a post with a semaphore for each direction) and directly they are notified of orders for a train they must show the stop signal, to indicate "orders waiting," and any train requiring to pass before the one to which the orders apply has to be given a clearance card to authorise it to do so. The precise way in which these signals are worked varies between the different lines. In early years they were often very primitive; flags or lamps only were used. On double lines the same principles were adopted, except that no account of opposing trains needed to be taken, which simplified the working. Where, as became the case on a few lines, the dispatcher could at any time run trains on the wrong line if he wished, single line principles had practically to be retained.

Safeguarding the Dispatching System

Any error in observing the rules under the dispatching system can have grave consequences. An order may be wrongly interpreted, forgotten or not delivered, or may itself contain an unnoticed mistake. Trainmen may overlook signals for a following section, and so on. As time passed, therefore, it was sought to safeguard the system by adding telegraph block working, some simple lock-and-block working, or automatic signals. On lines running through open country where the view was good, even at night because of the powerful headlight always carried, it was at first thought sufficient to put such signals at specially dangerous places where the view was obscured, but later they spread over large mileages and are still being extended. By this means any mistake in carrying out the dispatching system, resulting in opposing trains getting on a single-line section together, can result only in delay, provided the signals are observed, and with the later systems it is extremely improbable that these trains would leave crossing loops together at all. Now and then, there have been accidents due to sudden wrong working of the points at crossing loops by trainmen; probably the best known was the disaster at Tortuga, California, on September 20, 1938, fully dealt with in our issues for January 27 and July 28, 1939. With the adoption of modern signalling and the use of the telephone, with which a trainman can speak directly to a dispatcher if necessary, the rules on many lines have been somewhat modified, the dispatcher's functions have become nearer to those of a traffic controller's, and train orders have become less and less required; they have been abolished altogether in some places and signal indications alone have sufficed to regulate the train movements. On the heavy two and more track lines the working substantially resembles that in Great Britain, in this respect at least. On the single main lines, however, the dispatching system is being carried to its logical conclusion, as it were, by making the dispatcher into a signalman controlling an entire area under the centralised traffic control (C.T.C.) system. By giving him the power of controlling the points and signals at the loops he is enabled to achieve his purpose with no—or very few—orders; continuous track circuiting provides against any error. The passage of the trains is automatically indicated to him and he is far less dependent on operators for the execution of his wishes. The C.T.C. system is the scientific termination of principles accepted long before and will no doubt find increasing use as time goes on. Some 175,000 miles of route are still unprovided with any block signalling and there the dispatching system is the only means by which safe working is provided for. In considering what has been said above it must be remembered that the various railways use modified rules, to meet the signalling arrangements, if any, superimposed on the dispatching. These are so complete on some lines that the carrying of the white and green classification signals is now dispensed with. It is only possible to give here a general idea of the principles of dispatching; the details demand considerable study. The American railwayman is, however, brought up to them and they become part of his outlook and habits, without which no reasonable success could be achieved by it.

INSTITUTION OF LOCOMOTIVE ENGINEERS.—At a general meeting of the institution held on June 10, Mr. E. W. Marten, member, read a paper entitled "Development of the Locomotive Poppet Valve Gear in America" on behalf of the author, Mr. G. W. Alcock, associate, Vice-President, Franklin Railway Supply Co. Inc. The paper described the development work leading to the introduction in practical form of the Franklin system of steam distribution; this system is now employed in some fast passenger locomotives in the United States, notably in the two new Baldwin-built streamline 4-4-4-4 type units of the Pennsylvania Railroad which have four 19¾ in. by 26 in. cylinders, 80 in. driving wheels, and a boiler working at 300 lb. per sq. in. pressure. The advantage of the cam-operated poppet valves is that they give rapid opening and closing of steam ports, thus eliminating wiredrawing; also the admission and exhaust events can be timed independently of one another so that an early cut-off does not entail early release and excessive compression as it does with conventional forms of gear. Locomotive performance is considerably improved by the employment of poppet valves; a high m.e.p. and consequently a high drawbar effort can be maintained up to speeds at which considerable reductions are normally occasioned by wiredrawing and exhaust back-pressure; furthermore, the steam consumption per h.p.hr. is appreciably reduced so that water and fuel economies are obtained.

TRIMMING THE EDGES.—The Waste Paper Recovery Association points out that if correspondence is trimmed of unnecessary margins and waste space before it is filed, much valuable paper for salvage can be obtained. It does not take long for a filing clerk to trim letters down to the size occupied by heading and writing, and it is surprising how much paper can be made available, even in these days of economy letterheads. In one small office recently this pruning yielded five waste-paper baskets full in half an hour. The paper rescued was mainly of a high-grade quality, which at present is in very short supply, and is needed for maps, charts, and blueprints.

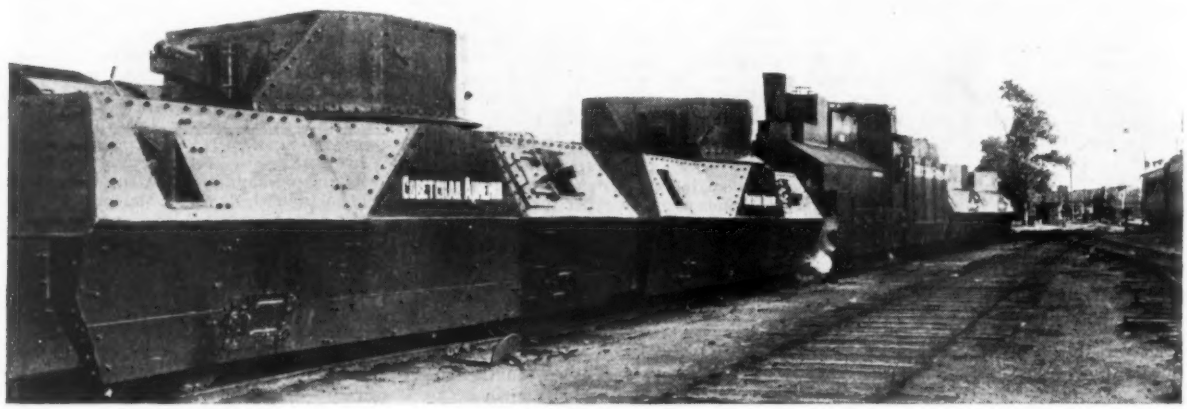
XUM

Armoured Trains as Mobile Artillery

The Russians are using modern versions of an old weapon

A DESCRIPTION some time ago in the *Evening Standard* by Godfrey Blunden reporting from Moscow about one of the Soviet's latest armoured trains, serves as a timely reminder that the greatly changed character and *tempo* of modern warfare has not resulted in the complete abandonment of all the older forms of mobile artillery. The Russian General who accompanied the reporter on his inspection stated: "Most countries considered the armoured train out of date years ago . . . Because of our civil war experience, the Red Army persisted with and improved them." The practical suggestions as to how it should be done, basically formed the armoured push and pull train as later developed. Apart from advocating the mounting of guns on wagons and fitting locomotives with shot-proof walls, he stressed their use on railways, particularly for coast defence.

In 1860 a military writer in *The Times* of July 16, suggested that a most efficacious line of defence round London would be a circular railway fifteen miles from the centre, primarily for strategical purposes, but available for ordinary paying traffic in peacetime. Armoured trains, on the lines



One of the latest Russian armoured trains built at Moscow an named "Soviet Armenia"

General explained that the great distances in the U.S.S.R., and the nature of the country generally, gave armoured trains a special advantage.

Understandable reasons make it impossible to mention any recent developments in this direction which may have taken place in Great Britain, but the following brief incursion into the origin and history of the armoured train may not be without interest in view of the account from Moscow.

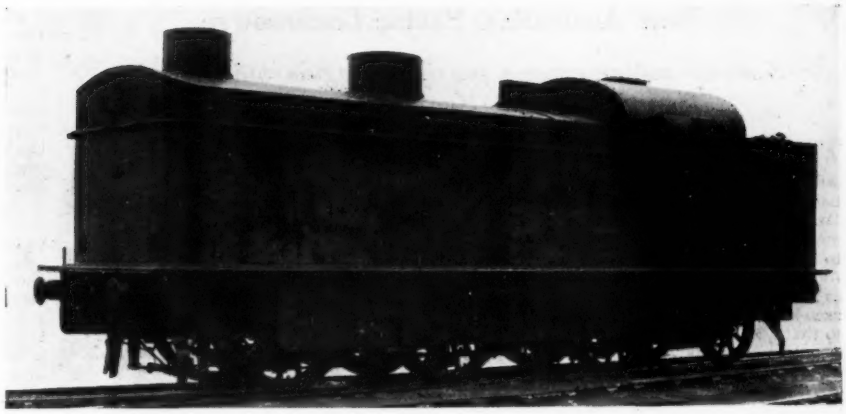
An authority on railways — William Bridges Adams (1797-1872)—had the idea of using railways for defending Great Britain against invasion. Edwin A. Pratt, in his book "The Rise of Rail Power in War and Conquest," states that so far as can be traced, Adams was the first to suggest the use of armoured trains. In the August 13, 1859, issue of the, now defunct, London periodical, *Once a Week*, there was published an article by Adams on "English Railway Artillery—A Cheap Defence Against Invasion," in which it was stated: "We have hitherto regarded the rail merely as a vehicle of transport to carry materials which are not to be set in work till off the rails. If we look at the rail as part of an instrument of warfare, we shall be startled at the enormous means we have instantly available, from mercantile purposes, to convert to engines of war." The occasion, says Pratt, was the prospect of an invasion of England by the French in 1859. Adams pointed out that heavy artillery had the disadvantage of needing horses to draw it, and urged that the rail should be used; his visualised by Adams, would be used on this and on the interior network of lines in the Metropolis.

Here the curious twist of history takes a turn, for it seems that, whilst discussion took place in Great Britain, America in her Civil War of 1861-65 introduced armour-protected gun-carrying trucks into warfare. Although experiences differed, there is ample evidence in contemporary publications that they served a useful purpose and an authority stated that they afforded protection to engineers and firemen against fire from guerrillas behind bushes. In the Franco-Prussian war of 1870-71, guns mounted on armour-plated trucks, fitted up by the Orleans company were in action on four occasions outside Paris during the siege.

Again the wheels of history turn in a topical direction, for in the Egyptian Campaign of 1882 an armoured train was put together, says Pratt, to assist in the defensive works of Alexandria, and proved most serviceable according to the military history of that campaign prepared by the Intelligence Branch of the War Office (revised edition, 1908). Two trucks fitted with iron plating and sandbags carried one Nordenfelt and two Gatling guns. A 9-pounder was placed on one truck with a crane for immediate lowering. Other trucks were made bullet-proof by sandbags and boiler plating. Later a 40-pounder was added on a truck protected by an iron mantlet. The train, strengthened by one Krupp and one Gatling gun, supported the attack on Tel-el-Kebir. It was left to F. S. Williams, in his "Our Iron Roads," to furnish a graphic and somewhat racy description of this train in action, and he quotes therein an account by "One of the Passengers," with a print of the train. It appears, and this is confirmed by Pratt's reference to it, that the Royal Navy was in this transaction, for Captain Fisher of the *Inflexible* seems to have had some say in the armour plating, and that blue-jackets, who comprised the "passengers" were "armed to the teeth, carried cutlasses at their waists, and Martini-Henry rifles in their hands, whilst some had revolvers in their belts, and all wore jack-knives."

In 1891 a distinguished officer raised the question in the Italian Parliament as to whether Sicily should not be defended by means of a coast railway and armoured trains. Meantime, important experiments were carried out by various nations, particularly, it would seem, to test and obtain data relative to firing at angles from armoured vehicles on rails. This was done, for example, at Delhi in 1886, and in France about the same time, and on the South Coast of Britain in 1894. The last mentioned is of particular interest to railwaymen, for associated with it is an early, if not the first, reference to their being associated with an armoured train in a military capacity. A 40-pounder Armstrong breech-loading gun was fitted on a truck by the London Brighton & South Coast Railway Company, by arrangement with the Government authorities, and firing and other tests were carried out by the 1st Sussex Artillery Volunteers, a large proportion of the members of which were employed at the Brighton company's works. This, apparently, was the first occasion on which a heavy gun had been fired broadside on the permanent way of an English railway, and the results were considered satisfactory by the military authorities.

The Boer War, 1899-1902, definitely established, says Pratt, the usefulness of the armoured train as an instrument of war and in that campaign it underwent its greatest development to that time for attack as well as defence. A fleet of 20 trains was constructed. Naval guns, a 6-in. breech loader and a 9.2-in. breech loader were mounted on old engine and tender frame foundations to designs of the machinery officers and the Chief Locomotive Superintendent of the Cape Govern-



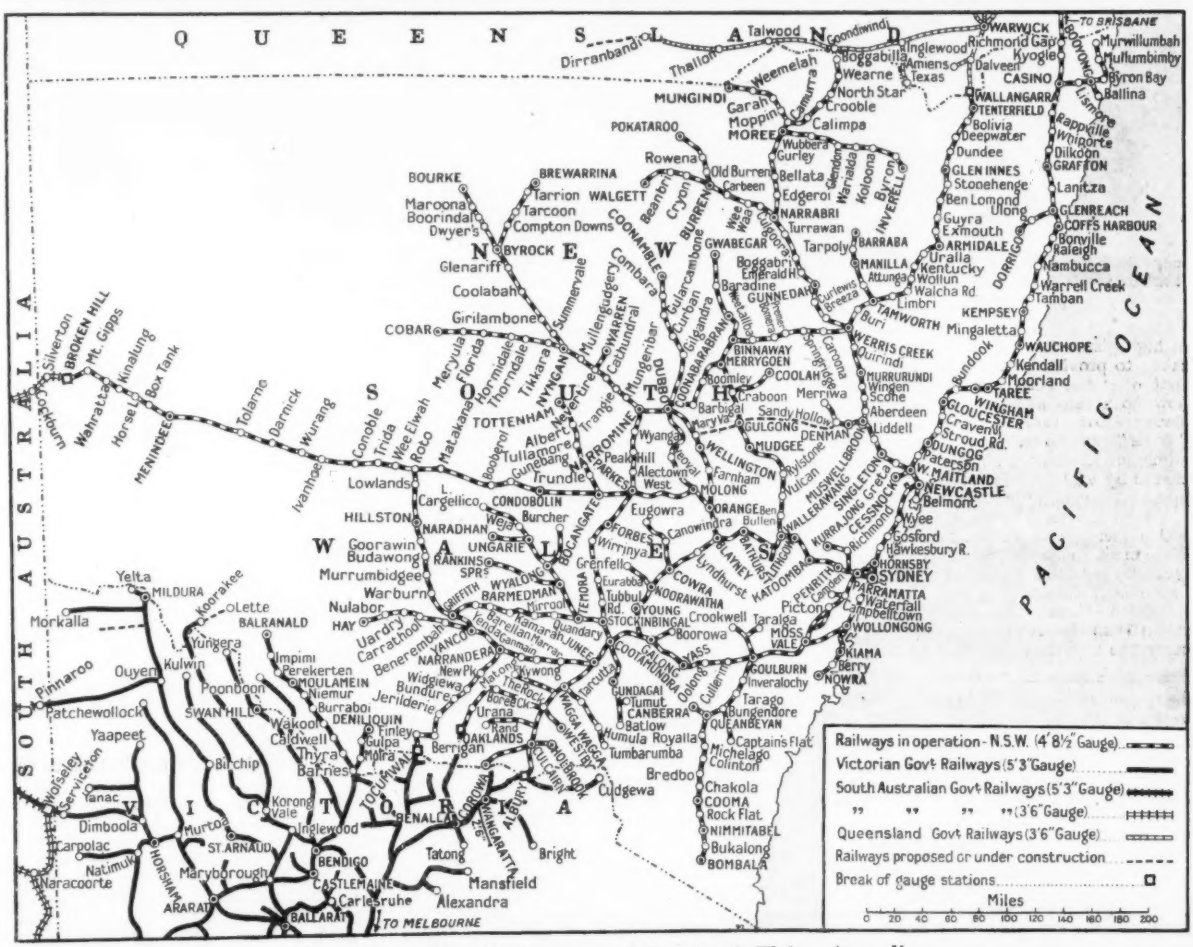
Ivatt "N1" 0-6-2 tank-locomotive armoured for coast defence train in 1914

ment Railways. The 6-in. gun was in action at Modder River, but the 9·2-in. gun, although run to Pretoria, had no opportunity of firing at the enemy.

In the early days of the war of 1914-19, consideration was given to providing armoured trains for coast defence in Great Britain. Two trains were made up from locomotives and vehicles supplied by various railways, and the armouring and so on was done at the L.N.W.R. works at Crewe. Edwin A. Pratt in another of his books—"British Railways and the Great War"—described these trains. The first was marshalled in the following order :—

Unit		Converted from
Gun truck ...	...	Caledonian Railway boiler trolley
Personnel vehicle ...		G.W.R. large coal wagon
0-6-2 tank engine ...		G.N.R. condensing type
Personnel vehicle ...		G.W.R. large coal wagon
Gun truck ...	...	Caledonian Railway boiler trolley

Each truck was divided into three compartments—12-pounder quick-firing gun platform, ammunition, and maxim gun. The personnel vehicles were fitted with rifle loopholes, and with food and water facilities, and also carried reserve supplies of coal and water for the locomotive. The train could be driven from the footplate of the engine or from each end, the latter through a vacuum-regulating valve operating a small vacuum cylinder on the engine, which in turn actuated, through a link and lever, an intermediate regulator valve fixed by the side of the smokebox.


QUEENSLAND
NEW SOUTH WALES
VICTORIA
SOUTH AUSTRALIA
PACIFIC OCEAN
Railways in operation - N.S.W. (4'8½" Gauge)
Victorian Govt Railways (5'3" Gauge)
South Australian Govt Railways (5'3" Gauge)
" " " " (3'6" Gauge)
Queensland Govt Railways (3'6" Gauge)
Railways proposed or under construction
Break of gauge stations
Miles
0 20 40 60 80 100 120 140 160 180 200

Map showing the railway system of New South Wales, Australia

(*See also pages* 636 *and* 646)

New Australian Pacific Locomotive

Semi-streamline express passenger engine built for the New South Wales Government Railways

TRIALS have now been carried out on the first of a series of semi-streamline 4-6-2 type express passenger locomotives being constructed by the Clyde Engineering Company for the New South Wales Government Railways. The new engine belongs to the "C 38" class; it is the first in Australia to work with a pressure as high as 245 lb. per sq. in. High-tensile steel is used in the construction of the boiler barrel so that additional strength to resist pressure is obtained without resorting to a shell of undue thickness and weight. A tractive effort of 36,200 lb. is realised at 85 per cent. boiler pressure with two cylinders of 21½ in. dia. by 26 in. stroke; the driving wheel dia. is 5 ft. 9 in. To ensure the attainment of high piston speeds, much care has been taken to provide steam pipes and passages that offer the least possible resistance to flow both into and out of the cylinders. Each piston valve is provided with a "trick" port to increase the area open to admission at short cut-off settings. Actuation is by Walschaerts valve gear with air-operated reversing mechanism.

The boiler has a Belpaire firebox of steel which has five 3 in. dia. arch tubes. A 36-element superheater incorporates a multiple regulator in one of the smokebox headers. This controls the admission of saturated steam. An 8-in. pipe brings steam from the dome and two 6½ in. pipes carry the superheated steam to the cylinders. A steam drier is fitted to the pipe in the dome.

An idea of the size and capabilities of the "C 38" class locomotive can be gathered from the table below which gives some of the more important particulars:—

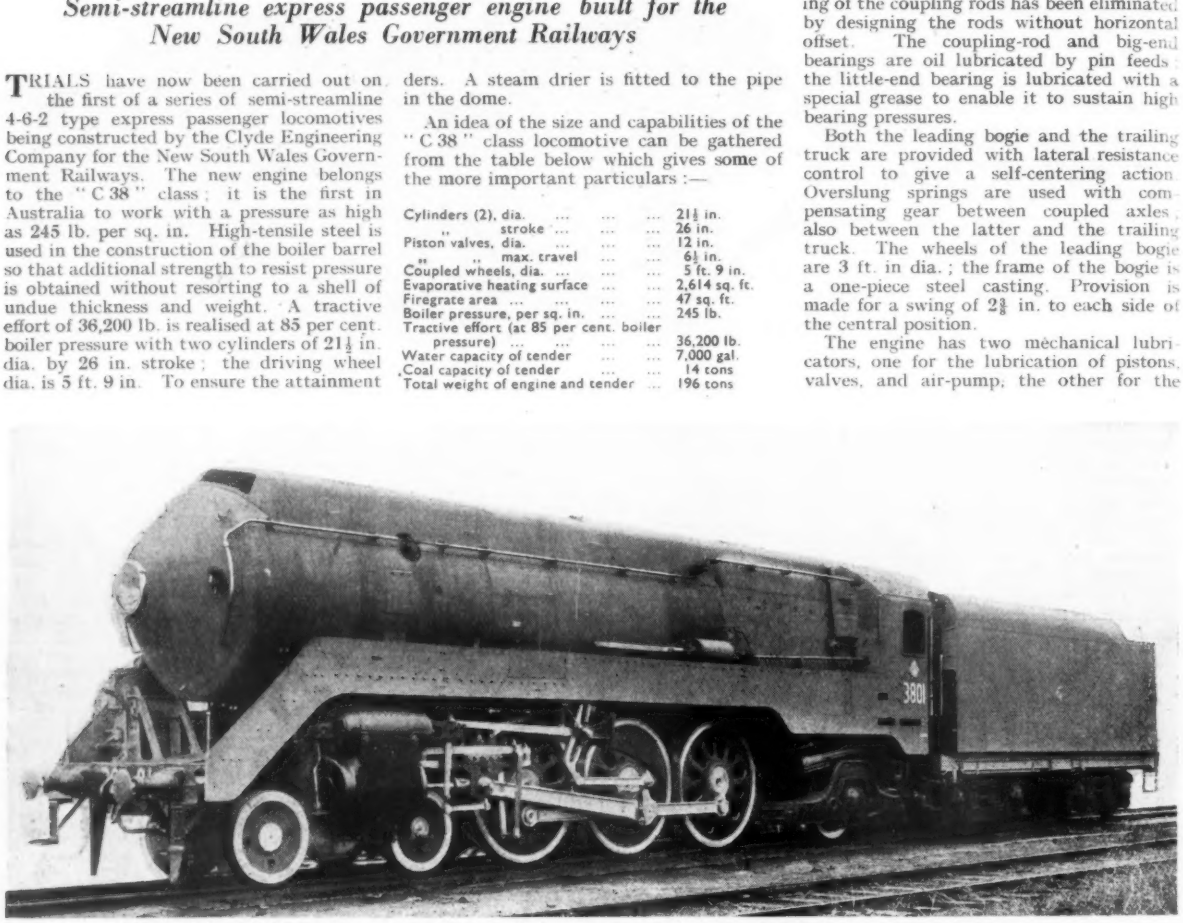
Cylinders (2), dia.	21½ in.
,, stroke	26 in.
Piston valves, dia.	12 in.
,, ,, max. travel	6½ in.
Coupled wheels, dia.	5 ft. 9 in.
Evaporative heating surface	2,614 sq. ft.
Firegrate area	47 sq. ft.
Boiler pressure, per sq. in.	245 lb.
Tractive effort (at 85 per cent. boiler pressure)	36,200 lb.
Water capacity of tender	7,000 gal.
Coal capacity of tender	14 tons
Total weight of engine and tender ...	196 tons

The greatest axle load is 22 tons 7 cwt. for the engine and 21 tons for the four-axle tender. The frame or bed of the locomotive accords with American practice; it is a one-piece steel casting that incorporates cylinders, smokebox saddle, air pump bracket, and even main air reservoirs. It is 43 ft. long and weighs 19 tons.

The running gear includes such modern features as roller bearings for all locomotive and tender axles; also Boxpok coupled and trailing-truck wheel centres. The connecting and coupling rods are of the conventional fluted design but the little end of the connecting rod is fitted with a spherical bearing to eliminate any twisting action on the slidebars, and the big end is fitted with a revolving bronze bush. The crossheads are of the Laird type with detachable slippers. Eccentric loading of the coupling rods has been eliminated by designing the rods without horizontal offset. The coupling-rod and big-end bearings are oil lubricated by pin feeds; the little-end bearing is lubricated with a special grease to enable it to sustain high bearing pressures.

Both the leading bogie and the trailing truck are provided with lateral resistance control to give a self-centering action. Overslung springs are used with compensating gear between coupled axles; also between the latter and the trailing truck. The wheels of the leading bogie are 3 ft. in dia.; the frame of the bogie is a one-piece steel casting. Provision is made for a swing of 2⅜ in. to each side of the central position.

The engine has two mechanical lubricators, one for the lubrication of pistons, valves, and air-pump, the other for the lubrication of all axlebox guides. Westinghouse A-6-ET air-brake equipment includes a 7 in. cross-compound air compressor and A-6-P pedestal brake valves. Two 15-in. dia. brake cylinders are carried by the engine; braking is applied to the driving wheels only, by means of cast-iron brake shoes. A special feature of the tender air-brake is the variable-load equipment by means of which the cylinder pressure of the brake is controlled by the level of water in the tender tank, thus permitting an increased braking force with a full tender. Similar equipment has already been in use on the "H" class locomotives of the New South Wales Government Railways.



First of the "C 38" class Australian-built locomotives, New South Wales Government Railways

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HENRY SPURRIER MEMORIAL SCHOLARSHIP.—The council of the Institute of Transport invites applications, from persons engaged in road transport or in pursuing studies for the promotion of knowledge of road transport, for the award in August, 1943, of (i) one Henry Spurrier Memorial Scholarship not exceeding £150, and (ii) at least twelve Henry Spurrier Memorial Grants not exceeding £25 each. Candidates for the scholarship, which may be awarded to assist in meeting expenses to be incurred in travel for studying road transport, in research in road transport, or in full-time study at a university or other institution, should have passed the graduateship or associate membership examination of the institute, or some other examination acceptable to the council. Grants may be awarded to assist students in the payment of various expenses incurred in the study of road transport. Applications, on a form obtainable from him, must reach the Secretary, Institute of Transport, 15, Savoy Street, London, W.C.2, not later than July 31 next. Each application must be supported by the candidate's employer or other responsible person having personal knowledge of him, and by a member of the institute.

HIGH-SPEED STEEL LICENCES.—Until recently only firms coming under the Machine Tool Control have sent their high-speed steel licence application to the control for approval. In future, all firms wishing to acquire high-speed steel on forms SC4/HT and SC4/LT should address, as and from July 1, their applications, and all correspondence, to the Controller, Jigs, Tools & Gauges, Machine Tool Control, 35, Old Queen Street, London, S.W.1. The Iron & Steel Control will continue to issue the appropriate licence after the application has been approved.

RAILWAY NEWS SECTION

PERSONAL

L.N.E.R. C.G.M.'s Department

It is announced that, following the retirement at May 31 of Mr. R. Bell, Assistant General Manager, the directors of the L.N.E.R. have approved certain changes in the organisation of the Chief General Manager's Department as follow :—

Mr. Kenelm Kerr, who since 1923 has been Assistant General Manager (Staff) with responsibility for matters relating to wages grade staff, now takes charge of all staff questions, including those connected with the managing and clerical staff previously handled by Mr. Bell.

Mr. O. H. Corble, who has occupied the post of Assistant to the Chief General Manager since 1932, has been appointed Assistant General Manager (Ancillary Services) with responsibility for questions relating to road transport, hotels, shipping, docks, air services, press publicity and advertising, and A.R.P. arrangement, continues to act as Chairman of the L.N.E.R. Post-War Development Committee, and as Industrial Agent.

Mr. T. F. Cameron becomes Assistant General Manager (Works & General). He is responsible for all works and general matters, including rolling stock and permanent way programmes, stores organisation and control, railway working, central intelligence, and matters arising in connection with the central traffic office.

Mr. V. M. Barrington-Ward continues, as a temporary wartime arrangement, to act as Assistant General Manager (Operating) with control of the central traffic office and co-ordination of inter-area operating arrangements.

Mr. C. P. Hopkins is appointed Assistant to the Chief General Manager, with charge of rates and statistics, pooling, and certain special matters connected with the R.E.C. and General Managers' Conference.

Sir Ronald Matthews, Chairman of the London & North Eastern Railway Company, has been elected to corporate membership of the Institute of Transport.

Mr. C. P. Fothergill has been appointed Deputy Regional Transport Commissioner for Scotland.

In the Supplement to *The London Gazette* of June 8, it is announced that the King has awarded the Imperial Service Medal to the following employees of the Transport Department of Tasmania : Messrs. W. Fennell, Driver-in-Charge ; W. D. Fisher, Engine Driver ; A. E. Johnson, Inspector ; J. A. McCarthy, Repairer ; T. D. Roberts, Ganger ; and A. A. Rubenach, Ganger.

We regret to record the death on June 11, at the age of 71, of Judge Thomas O'Donnell, S.C., Circuit Court Judge for Clare, Kerry, and Limerick, who was Chairman of the Tralee & Dingle Railway from 1905 to 1918.

Institute of Transport

Among those elected recently to corporate membership of the Institute of Transport are Mr. H. H. Grindley, Director & General Manager, Central Uruguay Railway Co. of Monte Video Ltd. ; Mr. H. F. Pallant, District Superintendent, York, L.N.E.R. ; Sir J. D. Ritchie, General Manager, Port of London Authority ; Mr. J. E. M. Roberts, District Superintendent, Sunderland, L.N.E.R. ; and Mr. W. Wordie, Managing Director, Wordie & Co. Ltd.

We regret to record the death on June 10 of Mr. W. J. Hosgood, M.Inst.C.E., M.I.Mech.E., who was Locomotive Superintendent, Rhodesia Railways, from 1911 to 1923.

The late Sir Haviland Hiley, who was Chairman of Traffic Commissioners, Eastern Area, and whose death was recorded in our April 9 issue, left £464.

Mr. P. W. Weaver, whose death was recorded in our May 28 issue, was Traffic Manager, Egyptian State Railways, from 1929 until his retirement in 1938 after 32 years of railway service in Egypt. He was the son of the late Mr. Henry Weaver, a former Station Superintendent at Paddington, Great Western Railway, and joined that company himself in 1896, receiving his early training in the Traffic and Goods Departments at Reading, High Wycombe, Basingstoke, and Winchester. He took up his first railway appointment in Egypt in 1906, becoming Assistant Traffic Superintendent at Tanta, the principal railway centre of Lower Egypt. During the war of 1914-19 he was stationed at Kantara, where he was in charge of all military movements on the northern section of the Suez Canal in connection with the defence of Egypt and the Gallipoli and Palestine campaigns. In 1919 he was transferred to Cairo as Assistant Goods Manager, and was appointed Goods Manager in 1922, which position he held until he succeeded Mr. Burton Pearson as Traffic Manager. At the funeral the Egyptian Embassy in London was represented by Rushdi Bey Tarfa.

The late Mr. P. W. Weaver

Traffic Manager, Egyptian State Railways, 1929-38

Mr. F. T. Pidding, Chief of the Personal Section, General Manager's Office, Waterloo, Southern Railway, who, as recorded in our June 11 issue, retired, on June 1, entered the service of the S.E.C.R. at London Bridge in March, 1900, and was appointed on the personal staff of the General Manager. He became Chief of the Pass Section at the amalgamation, retaining this position until December, 1934, when he was appointed Chief of the Personal & Works Section and Secretary of the Traffic Officer's Conference. Mr. Pidding has served directly under no less than seven General Managers : Mr. Alfred Willis, Mr. Vincent Hill, Sir Francis Dent, Sir Percy Tempest, Sir Herbert Walker, Mr. Gilbert S. Szlumper, and Mr. E. J. Missenden.

We regret to record the death through enemy action of Mr. T. R. Seddon, formerly Traffic Manager, Gold Coast Government Railway.

Mr. Cecil Baillie-Gage, who, as recorded in *The Railway Gazette* of March 19, and of April 16, recently retired from the position of Solicitor to the Great Northern Railway Company (Ireland), has received from the local solicitors who represent the company in various parts of the country an engraved silver salver. Mr. W. Gordon Bradley, Law Agent, Great Southern Railways (Eire), and Mr. Michael Knight, who presented the salver on behalf of the subscribers, expressed the good wishes of the latter and their regret at the severance of a long and pleasant association. Mr. Baillie-Gage said that he felt deeply touched by the mark of goodwill towards him from those with whom he had been so happily connected in the interests of the company, many of whom were old personal friends.

The late Sir Joseph McConnell, who was a Director of the Belfast & County Down Railway Company, whose death was recorded in our September 4, 1942, issue, left personal estate in England and Northern Ireland valued at £102,927.

A Century of Railway Service

Mr. Alexander William Crow Christison entered the service of the York, Newcastle & Berwick Railway in 1843. For a time he was Chief Clerk to Sir James Allport, then Manager of that line, which amalgamated with the York & North Midland and the Leeds Northern in 1854 to form the North Eastern Railway. Mr. Christison was appointed General Passenger Superintendent of the N.E.R. in August, 1856, which post he occupied for 34 years until his death in 1890.

Mr. Alexander Christison, the eldest son of Mr. A. W. C. Christison, after serving his pupilage at Palmer's Shipbuilding Yard, Jarrow-on-Tyne, entered the North Eastern Railway Locomotive Shops at York in 1876. A year later he obtained a situation in the G.W.R. Locomotive Works, Swindon. In 1889 he was appointed Divisional Locomotive Superintendent at New Milford and was transferred to a similar position at Neath in 1902 ; he retired in 1919.

Mr. A. W. H. Christison, only son of Mr. A. Christison, began his apprenticeship with the G.W.R. at Neath in 1903, and was transferred to Swindon in 1907. He served for two years in France during the war of 1914-19 and returned to the Drawing Office at Swindon in 1919. He was appointed Assistant Divisional Superintendent, Newton Abbot in 1922, and became Divisional Locomotive Superintendent in 1927, which position he still holds.

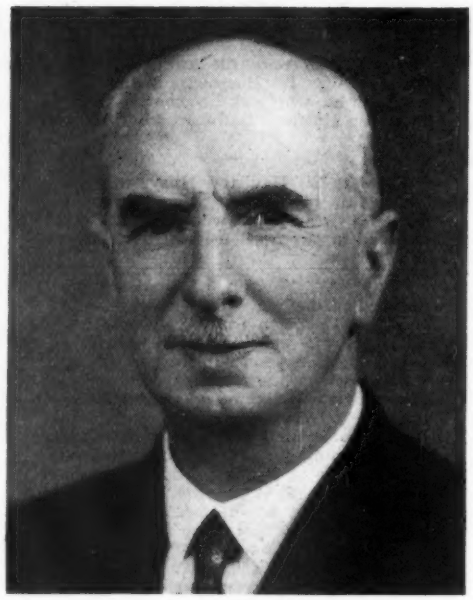
Mr. Alexander Christison, only son of Mr. A. W. H. Christison, entered the service of the G.W.R. as an apprentice in the Locomotive Department in 1936. He was transferred to Swindon in 1938 to complete his apprenticeship, before finishing which he joined the Royal Air Force.

XUM

The late Rt. Hon. Lord Gainford, who was a Director of Pease & Partners Limited, and whose death was recorded in our February 19 issue, left £25,628.

A Great Locomotive Engineer

In an editorial in our last week's issue we referred briefly to the sudden death of Mr. Samuel Jackson, M.I.Mech.E., M.I.Loco.E., Works Director of Gorton Foundry, Manchester, and a member of the board of directors of Beyer, Peacock & Co. Ltd. He was widely known throughout the locomotive and railway world and made a very definite contribution to the design and, particularly, the development of the steam locomotive. He received his preliminary technical training at Stockport College of Technology, and commenced his career as a locomotive engineer in 1896 by entering the service of the London & North Western Railway Company as a premium apprentice in Crewe Works, at that time under the superintendency of the famous F. W. Webb, whose well-known three-cylinder compounds were then at the height of their fame besides being the subject of much controversy in locomotive circles.



The late Mr. Samuel Jackson

Director of Beyer, Peacock & Co. Ltd., 1942-1943; Works Director, Gorton Foundry, 1938-43

After the completion of his Crewe apprenticeship in June, 1900, Jackson received a further training for three years as a pupil in Beyer, Peacock & Company's works at Gorton spending a few months in each department and completing his pupilage in the Drawing Office in June, 1903; he thus served a seven-year apprenticeship. At the termination of his pupilage he had the unusual distinction at that time of an offer to continue in the service of the firm as a draughtsman, which he accepted. Early in 1904, promotion came in the form of a move to the special department where all new designs of locomotives were prepared and, for several years, this class of work, with its opportunities for intensive training and getting to the root of the matter in locomotive design and calculations, occupied his attention. During this period the idea for the now well-known Garratt locomotive was brought to the notice of the firm and, in collaboration with the late Mr. H. W. Garratt, Jackson, in 1907, produced the first Garratt locomotive design, which drawing was used in the Patent Specification. Many remarkable engines of this type will long remain a monument to his outstanding designing abilities. In fact, it may indeed be said that he created the basic technique of this system of articulation. As early as 1910 designs for Garratt locomotives, equalling in power those of the present day, were prepared and submitted to railway companies in various parts of the world, but some years elapsed before the merits of the Garratt locomotive became generally appreciated.

In 1913 Jackson was appointed Assistant Works Manager, and during the period of the war was mainly responsible for the re-organisation of Beyer, Peacock's erecting and machine shops and the conversion of the machinery to meet the requirements of armament manufacture. At the close of the war, he became Works Manager and had the onerous task of re-organising the works for peacetime production. In 1924 he was appointed Advisory & Development Engineer, a position which embraced the investigation of all special technical matters submitted to the company. It was in this capacity that, in collaboration with the Ljungstrom Turbine Company of Sweden, he spent some three months in Sweden at the Works of Nydquist & Holm, collaborating in the design of the 2,000 h.p. Ljungstrom Turbine Condenser Locomotive, subsequently superintending its construction at Gorton and trials on the L.M.S.R.

In June, 1925, the control of all the designing and drawing office staffs was placed under him and a few months after he assumed control of the works, with the result that, in January, 1926, he was appointed Chief Designer & Works Manager, a position which he held until his appointment as Manager of Gorton Foundry in 1930. In 1932, he was elected a director of the Richard Garrett Engineering Works, a subsidiary company of Beyer, Peacock & Co. Ltd., and in 1938 was made a member of the local board of the company as Works Director at Gorton Foundry. In 1942 he became a Director of the board of Beyer, Peacock & Co. Ltd., and thus attained that infrequent distinction of rising from an apprentice in the works to a director of the company to which he had devoted his life.

The first large Beyer-Garratt engine with which Jackson was intimately associated was for the Nitrate Railway of Chile in 1926; a 2-8-2 + 2-8-2 weighing 187 tons and a grate area of 69 sq. ft. for 1 in 25 operation. Numerous designs all outsize, so to speak, for the gauge and limiting factors, followed, culminating in the great 90,000 lb. tractive effort South African Railway design, the 4-8-4 + 4-8-4 Kenya and Uganda and the 4-6-4 + 4-6-4 Sudan and Rhodesia. These three types all had original wheel arrangements and were the largest engines for the gauge and weight of rail on the railways concerned. Many other Garratts for unusually severe conditions also received much of his attention. Jackson also took a leading part in the many designs of Beyer-Garratt engines built by Continental firms under his firm's supervision, and amongst many engines built under this arrangement undoubtedly his greatest contribution was the Algerian express passenger Garratt which has over 60,000 lb. of tractive effort, weighing 212 tons and over a number of years has proved itself capable of maintaining high speeds up to 80 m.p.h. He also visited the U.S.A. and Moscow, the latter in connection with the largest Garratt so far built, which weighed 255 tons and had a grate area of 86 sq. ft.

Jackson had an encyclopædic knowledge of British, Continental and American locomotive practice. His amazing memory for locomotive detail and his designing ingenuity were as continual a source of admiration to his friends as they were to the advantage of the company he served. A Lancashire man, he had a directness that sometimes belied his sympathetic nature. Many a man has cause to remember this quality with gratitude. His passing is a loss to his firm, the locomotive industry, and, indeed, the country. During the last three or four years he had again had to face a works under war conditions, and the numerous letters received by the firm, including the Government departments, refer in eulogistic terms to his work during these difficult years. To quote the words of a letter from the War Office, ". . . it can be truly said that he made his contribution to the war effort."

Mr. Marthinus Cornelius van Schoor, the designer of the new single-line electro-mechanical train token instrument for which he was recently awarded a premium of £5,000 by the South African Railways & Harbours Administration, was born in December, 1880. He entered railway service in 1911 at Cape Town. He was transferred in 1920 to Bloemfontein as Telegraph Inspector in charge of the Free State, Cape Eastern, and Cape Midland Railway Systems. Mr. van Schoor retired from railway service in December, 1940, at which time he was Acting Electrical Engineer.

Mr. M. C. van Schoor

Awarded £5,000 premium by the South African Railways & Harbours

TRANSPORT SERVICES AND THE WAR—195

Colour-Light Signals

By the introduction of colour-light signals (instead of arm signals) between Willesden and Camden, the L.M.S.R. has been able to speed up the movement of war traffics and, at the same time, to dispense with two signal boxes at Queens Park Station.

Civilian Air Raid Casualties in May

The Ministry of Home Security has announced the following figures of civilian casualties due to air raids in the United Kingdom during the month of May :—

Killed (or missing, believed killed)	584
Injured and detained in hospital	733

The casualties are classified as follow :—

	Men	Women	Under 16
Killed (or missing, believed killed)	213	266	105
Injured and detained in hospital	289	343	101

Car Requisitioning in the North

Private cars laid up by their owners in the North of England are now being requisitioned for the Army. Working from a register of laid-up cars which was prepared last autumn, Government inspectors are valuing cars which may be of service to the Forces and negotiating prices with the owners. Hundreds of cars have already been taken over in the North, and it is stated there has been little difficulty so far in agreeing upon a valuation with the owners. As far as possible compulsory acquisition is avoided, and the terms offered for really good cars are better than some owners expected. The cars when taken over are overhauled mechanically at R.E.M.E. depots and are then passed on to Returned Store depots for camouflaging.

War Task of the L.M.S.R.

The loaded wagon miles run by the L.M.S.R. in 1942 totalled 1,713 millions. This is 82½ millions more than in 1941, and is 435½ millions, or 34 per cent. more than in a pre-war year. Some 390,000 wagons are used every week to move traffic originating on the L.M.S.R. Locomotives of the L.M.S.R. hauling freight trains covered 121 million miles last year—an increase of over 3½ millions over 1941 and nearly 19 million miles more than in 1938.

On the passenger side the traffic figures are no less impressive; 55 million more passenger journeys were made last year than in the preceding 12 months. The most outstanding rise has occurred in workmen's journeys. For the year 1942 an increase of nearly 50 million journeys was recorded above the comparative peace-time figure.

Every week nearly 500 special trains, passenger and freight, are now being run by L.M.S.R. for the Services, and, in addition, between 800 and 900 parties of Forces personnel are accommodated every week on ordinary trains, apart from the large numbers travelling for which accommodation is not reserved.

Weekly Bus Tickets in Lanarkshire

The Regional Transport Commissioner has issued a direction that, from Sunday, June 27, the various forms of 10-journey, 12-journey, and 24-journey weekly tickets issued by the Central S.M.T. Co. Ltd. and the Lanarkshire Traction Co. Ltd. will be available only to workers who hold a certificate from their employers certifying their specific employment. The certificates will be valid for a period of thirteen weeks. This step will limit even more rigidly the issue of concession tickets to essential workers.

Irish Workers in Great Britain

It is reported in *The Irish Times* that an arrangement has been made by the Governments of Great Britain, Northern Ireland, and Eire, which will greatly facilitate workers when returning to their homes in Eire for holidays. From July 1 until October 31 the permit system will be virtually suspended, and in its stead an arrangement will operate by which workers will be able to travel on a letter from their employers stating that the bearer is on holiday from a specified date.

Instead of the sometimes very prolonged procedure of acquiring an exit permit from the Government Department, the person concerned, having obtained the sailing ticket required by the L.M.S.R., will take the employer's letter to the nearest police station, where the necessary stamping will be done without further difficulty.

Moreover, in the case of a large firm employing hundreds of Irish workers the police will visit the firm and give the necessary authorisation on the spot. Upwards of 300 firms have been scheduled to which the police are prepared to go for this purpose. The privilege thus granted will be available for the return journey as well as the outward. It will apply also to persons returning to Eire through Northern Ireland, as well as to those travelling direct from Great Britain.

Withdrawal of Unlimited Bus Tickets

On Monday last, June 21, all forms of unlimited travel tickets ceased to be issued by the West Yorkshire Road Car Co. Ltd. and its associates, with one or two exceptions on special portions of roads. A schedule of weekly 12-journey tickets was introduced, and authorised revisions were made in the issue of daily workmen's return tickets. Where 12-journey tickets have been introduced, the workmen's return fare has been withdrawn. The changes are extensive, and represent a policy which will probably be adopted by other bus undertakings in the North-Eastern Traffic Region.

German Railway Regulations Extended

From July 1, German railway regulations will be extended to all railways in Sudetenland (now called Reichsgau Sudetenland) and in Austria (Alpen- und Donau Reichsgau), in accordance with the provisions of the Order of February 6, 1941.

Overloading German Goods Wagons

An Order issued by the German Ministry of Traffic, effective from June 1, abolishes overloading of German goods wagons in excess of the "loading capacities shown on the sides of the vehicles." The Order applies to Germany proper, and also to the occupied regions in the West and in the East (*West- und Ostgebiete*) without any precise definition, as well as to the General-Gouvernement of Poland and the Protectorate of Bohemia & Moravia. This does not represent any change in the position as it was before June 1, as the indication of loading capacity shown on the sides of the wagons have all been changed in recent months so as to show the actual wartime overload capacity, and not the normal loading capacity as heretofore.

German Motor-Road Maintenance

In order to release more labour for war work, routine maintenance of the *Reichsautobahnen* has been suspended, according to a German radio announcement of June 10. In addition, petrol-filling service-station facilities are being reduced, but producer-gas stations will generally remain

WAY OUT
VILLIERS STREET
CHARING CROSS
[SOUTHERN RAILWAY]
STRAND
[NORTHERN LINE]
ALL CLEAR
WAY OUT
EMBANKMENT
& TRAMS
AIR RAID ALERT
NO TRAINS BETWEEN PICCADILLY, ELEPHANT & CASTLE, STRAND AND KENNINGTON.
STRAND STATION - NORTHERN LINE TOP OF VILLIERS STREET FOR EUSTON, CAMDEN TOWN, HIGHGATE, GOLDERS GREEN, EDGWARE, BARNET.
EMERGENCY BUSES IN NORTHUMBERLAND AVENUE FOR PICCADILLY, WATERLOO, ELEPHANT & CASTLE [FOR MORDEN LINE]
AIR RAID ALERT HAS SOUNDED
WAY OUT
EMBANKMENT
& TRAMS

Reversible signs at Charing Cross Underground Station provide for the direction of passengers in the event of an air raid. The above illustrations show (left) the normal direction which is given when there is no raid; and (right) the direction which is given when an "alert" has sounded, and the tube service between Piccadilly, Waterloo, and Elephant & Castle is covered temporarily by emergency buses

Anti-aircraft gun on Italian train. The train approaching is composed of oil tank wagons

open. These admirably-engineered concrete highways are, of course, capable of handling heavy emergency traffic for a considerable time without serious deterioration, especially as civilian road transport has been greatly reduced. Press reports that the motor roads "have proved a failure" provide but another example of uninformed "wishful thinking." They are a potent military adjunct.

German Trams in Wartime

The Hagener Strassenbahnen A.G., of Hagen (Ruhr) was able to show an operating surplus of RM. 120,000 for 1942, after having recorded a debit balance for a number of years. The company's share capital is wholly owned by the Hagen municipality.

The Süddeutsche Eisenbahn A.G., of Darmstadt-Essen, terminated its ownership of the two tram lines connecting Wiesbaden and Mainz (a distance of about 6 miles) and ceased operating them as from April 1. In future, the two lines are to be worked jointly by the Wiesbadener Stadtwerke (Wiesbaden electricity works) and the Mainz Municipality. The former has also taken over a line at Wiesbaden formerly owned and worked by the company.

The Stuttgart trams recorded an increase of 13·73 per cent. in their passenger traffic in 1942, but car-kilometres declined, indicative of heavy overcrowding. Goods traffic by tram exceeded all previous records and was responsible for 193,000 wagon-kilometres. Bus traffic declined, as a result of tyre shortage.

The Esslingen Trams had an increase in the number of passengers carried in 1942 of 19·45 per cent. over the 1941 figure. To facilitate traffic, a universal fare was introduced on January 1, 1943.

Recent changes in the holdings of the Allgemeine Lokalbahn und Kraftwerke A.G., of Berlin, have made it a holding company. As a result of the reorganisation of the Kiel Tramways, these were taken over by the Kieler Verkehrs A.G., while RM. 11,000,000 in its share were ceded to the Allgemeine Lokalbahn. This company in turn passed RM. 6,780,000 in shares to Kiel municipality, thus retaining only a minority holding. Particulars of this transaction were published in *The Railway Gazette* of September 11, 1942, page 263. On the other hand, the company increased its holdings in the Strasbourg Trams (Strassburger Verkehrsbetriebe A.G.), and secured a majority holding in the Elektrobau A.G. of Linz. The company also holds a minority participation in the former, Danziger Elektrische Strassenbahn A.G., now the Verkehrsbetriebe Danzig-Gotenhafen A.G. since the amalgamation of the Danzig and Gdynia tram systems. It will be recalled that Gotenhafen is the German designation of Gdynia. The share capital of the reorganised concern was increased from RM. 8,000,000 to RM. 10,000,000, and the difference taken over by the Gdynia municipality. The main interest now left to the Allgemeine Lokalbahn is its participation in the Görlitz Trams.

Travel Relaxation in France

Foreigners whose passports are in order or who have an identity card valid for 1943, may in future travel freely in France, excepting in forbidden military zones, according to a Paris despatch to the Italian News Agency. Foreigners arriving in France must obtain a travel permit from the police if they propose to stay less than two months.

Roumanian Trains in Russia

The Roumanian State Railways have extended their operations into occupied territory of the Soviet Union, and are maintaining regular communication to Odessa from Bucharest *via* Ploeshti, Jassy, Tighina, and Tiraspol. Berlin may be reached from Odessa *via* Ploeshti, Cernauti, Lemberg, and Krakow. It is claimed that local trains are operating from Odessa to Constanza, Giurgevo, Timishoara, and Brashov. The Bucharest-Odessa railway is an important line, and an effort is being made to speed up the service; under present operating conditions the trip is said to take 21 hours, as speed is retarded by the poor roadbed. In their improvement works, the State Railways will use imported stone and gravel in preference to the soft soil of the country. Additional siding, tracks, and bridges will be constructed to avoid delays at wayside stations. It is admitted there is a shortage of locomotives, but goods wagon stocks are being supplemented by vehicles taken from western Europe. It is stated that no shipments of over 1,500 kg. are accepted in any one day from an individual, except for specific essential goods.

Indian Railways in Wartime

The Report by the Railway Board on Indian Railways for the financial year 1941-42 says that the strain on railways on account of the war increased greatly during the year. Military traffic reached unprecedented levels, supplies similarly increased, and industries throughout the country expanded steadily. The slack period, which was a normal feature of railway working during the summer months, disappeared completely in the summer of 1941 and railways were therefore not in a position to make up arrears of traffic which had accumulated during the previous busy season. Alternative means of transport contracted seriously, and, while all essential traffic moved, railways were not able to meet in full all the demands placed on them.

It was necessary during the year to control the distribution of coal by the appointment of a Coal Distribution Officer and towards the end of the year a priority system for the control of all transport by rail was introduced. Difficulties in obtaining supplies of materials increased, and railways were strictly rationed in their demands for commodities such as steel. During the early part of the year, the efforts of railways were concentrated largely on assisting the transport needs of the Forces guarding the western approaches to India in Iraq and Persia. Towards the end of the year the approach of the Japanese to the eastern frontier of India caused very considerable changes in the normal flow of traffic in the country as a whole and very heavy traffic to the North-East Frontier. These changes further reduced the capacity of the railways to meet demands in full.

While the resources of the railways were employed primarily in meeting demands for transport, they were still able to render assistance to the war effort to an even greater extent than in the previous year. Work on munitions production in railway workshops steadily increased and at the end of the year more than 16,000 railway employees were engaged solely on this work. About 230 officers had been released for services in the Army or with the Supply Department, and a number of subordinates had also been released to be given emergency commissions in Railway Transportation Units. Railways, also, at the special request of the Defence Department, undertook the recruiting and training of a large number of men for Railway Military Units for service overseas, and had to find from their own resources the officers and staff to do the recruiting and training. Track and rolling stock were supplied to the Defence Department both for overseas and for use in India. With the approach of the war to India's frontiers, a large A.R.P. organisation was built up on railways and this was controlled by a special organisation in the Railway Board.

South African Railway Builders

In a broadcast to the Union of South Africa on June 9, General Alexander said: "South Africa has sent us more sappers than any other Dominion. Their genius for building railways, tunnels, roads, and harbours has been demonstrated from Syria to Tunis. It was grand work done by grand men."

Rapid Trans-Siberian Transport

The increased rate of railway traffic on the Trans-Siberian line is indicated by the fact that during May the reception of trains on the Omsk section was 11 per cent. higher than during April. On one section of this line 45 trains passed through in 10 days at speeds described as characteristic of the Red Arrow. The Red Arrow was the *de luxe* night express between Moscow and Leningrad before the war; it was the fastest train in the Soviet Union.

Mexican Road Link

A new 424-mile highway which will connect the Mexican cities of Torreon and Durange with the Pacific port of Mazatlan is now nearing completion, according to the Mexican Director-General of Highways. Torreon is an important railway junction on the central plateau region, in the middle of a rich cattle and agricultural region and about half way between the Atlantic and Pacific Oceans. The town of Durango is almost in the centre of the State of the same name. This region has substantial agricultural and mineral resources. Mazatlan is on the Pacific Ocean near the southern end of the Gulf of Lower California, and has an excellent deep-water harbour. It is on the main west coast railway between the U.S.A. and Mexico City. There is already a standard-gauge railway between Torreon and Durango, but only part of the rail extension thence to Mazatlan has yet been built, as shown on the map in our March 5 issue, page 240.

Railway Sabotage in Serbia

By Alexander C. Niven

Of all the activities of the Jugoslav patriots, railway sabotage has proved the most costly to the enemy. From reports received by the Jugoslav authorities in London, it appears that this is especially efficient in Serbia, through which run the important lines of communications for the supply of troops in Greece. This sabotage began when patriots began to add minute quantities of sand to the lubricating oil and grease used for locomotives and wagons. Through these and similar activities many trains were delayed for many hours.

On December 6, 1942, no fewer than 250 wagons arrived at Lapovo Station for repair, because their axles were damaged by the corrosion effected by the sand in the lubricating oil and grease. Such incidents happen daily at many other stations and it is no rare thing for trains to stop suddenly on a journey through some mysterious defect, and have to wait for hours before an emergency locomotive is able to clear the line. Commissions set up by the Germans have so far not been able to find the causes of all the defects. Between December 4 and December 26, 1942, there were known to be 15 railway accidents in Serbia due to patriot sabotage.

On January 1 last, out of 362 standard-gauge locomotives, 112 were out of order; and of 136 narrow-gauge locomotives, 50 were disabled through sabotage. In other words, of the total number of locomotive stock, 29 per cent. were out of order. Between January 1, 1942, and January 20, 1943, it is understood that 259 locomotives were sent to Belgrade alone for repair; all had been sabotaged in one way or another. This represents a total of more than 20 locomotives a month, and, if figures for other repair works were known, it is believed that the number would be more than trebled.

Carriages and wagons, for both passengers and freight, share the same fate, and at present more than 35 per cent. of all wagons in the country are said to be out of order. Repairs take a long time, and the Germans daily find it more difficult to supply the various repair centres with the necessary spare parts.

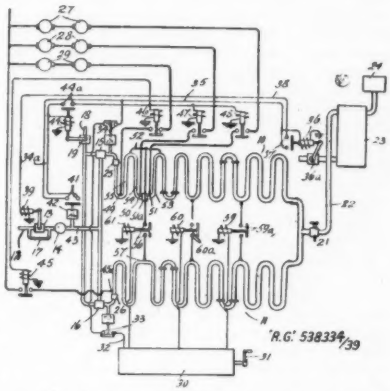
The blowing up of railway lines, and the damage to other communication, are further causes for German anxiety for her supply lines through Jugoslavia. Such activities are believed to be just as energetic in Croatia. There, every train is guarded by at least 50 soldiers. Train composition in Croatia is interesting, for every train has at least two armoured wagons with machine guns. The lines have been cleared of any bushes or trees on each side for 3 km. The trains run only by day, and the speed is well below that of peacetime. Attacks on these trains are daily events. By reason of geographical features, such as railways traversing deep cuttings, it often happens that a train is wrecked or blown up in such a way that the line is out of order for a week or more.

Abstracts of Recent Patents*

No. 538,334. Electric Vehicles

The British Thomson-Houston Co. Ltd., Crown House, Aldwych, London, W.C.2. (*Convention date: August* 4, 1939).

In dynamic braking systems for electric locomotive motors the braking resistor consists of two duct sections 10, 11. Cooling water is fed through pipe 12, a normally closed valve 13 and a check valve 14 to two steam-operated water injectors 15, 16, and there is a continuous small flow of water around valve 13 through by-pass 17. High pressure steam is supplied from pipe 18 through a spring-pressed steam valve 19 and pipe 20 to the injectors 15, 16. From the sections 10, 11 heated water and steam pass through a manual valve 21 and pipe 22 to a separator 23 from which steam passes to a condenser 24. Sections 10, 11 are electrically insulated from the cooling water supply pipes by means of insulating pipes 25, 26. The motors 27, 28, and 29 to be dynamically braked have a controller 30 with handle 31. To effect braking, conductor 32 is connected to an electricity source of constant voltage so that coil 36 is energised through a circuit including normally closed switches 33 and 34, and conductor 35. Coil 36 opens water drain valve 36*a* and closes switch 37 to complete a circuit through conductor 38 and coil 39 to earth, thus opening cooling water valve 13. The water operates a switch 41 by means of a piston 42 connected to water supply pipe 43. Switch 41 completes a circuit through conductors 35 and 34*a* and coil 44 to earth, the coil 44 opening the steam valve 19, thus admitting steam to injectors 15, 16, and also closing switch 44*a*. This switch 44*a* closes a circuit from conductor 35 through switch 41 for coils 45, 46, 47, 48 to



earth, thus connecting the motor circuit to 45*a* on the braking resistor, and operating switches connecting the motors to 49, 50, and 51 on the resistor, there being an insulator 51*a*. Thus, by means of conductor 52, short sections 53, 54, 55 of the resistor are connected with the pairs 27, 28, 29 of motors. The last short-circuiting contactor 56 does not break these connections or the circuit of section 57.—(*Accepted July* 29, 1941).

*These abridgments of recently published specifications are specially compiled for *The Railway Gazette* by permission of the Controller of His Majesty's Stationery Office. The full specifications can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s.

L.N.E.R. Mobile Canteens

The L.N.E.R. has solved the victualling problem of men engaged on urgent work by the conversion of household removal containers into kitchens.

The containers are 17 ft. long and carry 50 gal. of water in two 25-gal. tanks. Lighting, heating, and cooking are performed by calor-gas working through incandescent burners, stoves, and gas rings; 10 gal. boilers and portable thermos urns of 5 gal. capacity are provided for tea and soup, and can, if necessary, be carried from the canteens to the site. Normally, service is from the canteen and there is a serving counter on each side of the container.

Left: A mobile canteen converted from a household removal container mounted on a railway wagon. Right: Loaded on to a road motor

British Electric Traction Co. Ltd. Annual Meeting

The forty-seventh ordinary general meeting of the British Electric Traction Co. Ltd. was held on June 18 at Winchester House, Old Broad Street, London, E.C. Mr. Richard J. Howley, C.B.E., Chairman, of the company, presided.

The Chairman, in the course of his speech, said that for many years past the company had been able to show increases in gross revenue, but this year it had to record a slight decrease. The revenue amounted to £760,293, compared with £767,588 for the preceding year. The reduction was due in the main to smaller distributions by two of its subsidiary companies which had been necessitated by the incidence of taxation.

Apart from taxation, expenses amounted to £59,868, an increase of £4,902. Taxation required £51,553, compared with £105,750 in the preceding year, and, after providing for debenture-stock interest, the profit was £569,393, an increase of £42,000. The directors recommended the payment of the the same dividends as last year, leaving a balance of £50,435 to be transferred to undivided profits account.

The increase in the profit was accounted for by the reduced charge for taxation. He had mentioned last year that, due to uncertainty as to the value to be placed on some of the company's assets for the purposes of excess profits tax, the basis on which it was to be assessed had not been settled. He was glad to say that the basis for the valuation of the assets and for the calculation of the amount of capital employed in the company's business now had been agreed. On the agreed basis there was no liability for excess profits tax for the year ended March 31, 1943, or for previous years. Accordingly no provision had to be made this year for taxation other than income-tax. Last year £50,000 had been provided for excess profits tax, and in the two preceding years £120,000, making a total provision of £170,000. This taxation reserve was no longer required and had been transferred to undivided profits account.

The balance-sheet showed few changes to which he needed to draw attention. The company's total investments stood at £6,844,170, compared with £6,805,447. It would be noticed, however, that its investments in subsidiary companies were higher by some £1,166,000, but that was compensated for by a reduction in its other investments. In the main, those alterations were in the nature of a change in classification, and came about as the result of the liquidation of Tilling & British Automobile Traction Limited, and the formation of B.E.T. Omnibus Services Limited, which took over approximately one-half of the assets of the Tilling & British company. The former investment in the Tilling & British company appeared in the balance-sheet under the heading of "other investments," whereas the new investment in B.E.T. Omnibus Services was included in "subsidiary companies."

The cash position remained strong and at the close of the year the company had £396,607 in cash.

On the other side of the balance-sheet, the only item calling for comment was the reduction in sundry creditors from £213,908 to £41,050. That was almost entirely brought about by the transfer to undivided profits account of the taxation reserve of £170,000 to which he already had referred. Undivided profits now amounted to £2,204,246.

Of the company's many interests, the most important was its large investment in companies providing road passenger transport services in the provinces. It might interest shareholders to know that the B.E.T. group of companies owned some 8,500 buses, which had operated approximately 243 million miles during 1942 and had carried some 1,400 million passengers. The companies' bus services were managed locally, but at the same time they had skilled direction and could draw on the experience of officers who were experts in the technical and financial questions which arose from time to time, even in the smallest undertakings.

The operating companies had established a reputation for the excellent public services they provided. That he attributed to enterprise in providing for the public needs, economy in operation, and civility and attention to the passengers. All that had been achieved with capital provided by the British Electric Traction Co. Ltd. and other shareholders; in other words, the capital had been found at no cost to the taxpayer or ratepayer.

Forms of transport were apt to change quickly. In his time he had seen electric tramways come and go; and all were wondering just now what effect the war would have on air travel and what its reactions would be on other forms of transport. State ownership was ill-suited to administer changing services where enterprise and imagination were required for success.

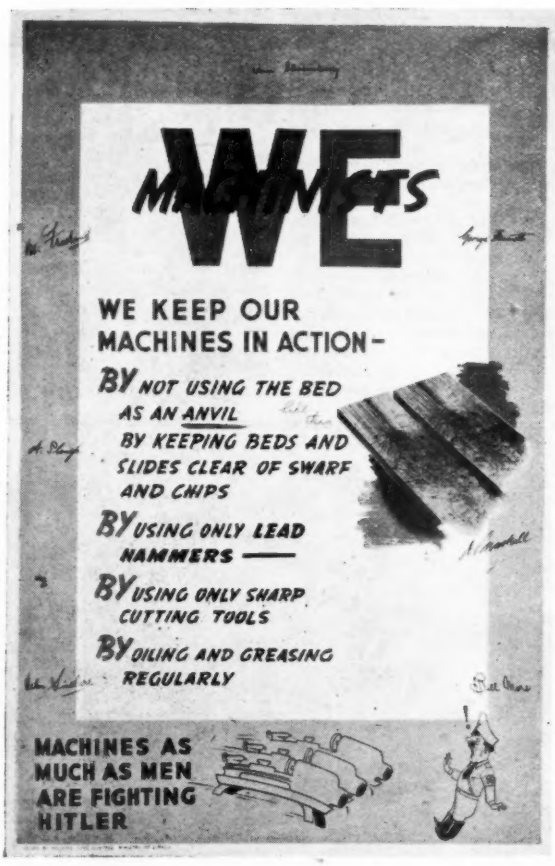
He did not suggest that State control of public utilities was unnecessary; it was there already, and in his view it was a function of the State. But control and regulation, to be just and efficient, should not be mixed up with State trading. We wanted State control to be honest and wisely exercised without favouritism.

Important public men had pointed to the wonders of production by war factories as justifying the extension of State trading after the war, but he had failed to find any reference by them to the cost at which such work was carried out. Under war conditions output, rather than costing, was the first consideration; but in peacetime economy was vital for cheap travel and success. To say that the immense outputs achieved by the Ministries of Supply and Aircraft Production justified State trading in peacetime was, in his opinion, to put forward an unsound argument.

Cheap and efficient road passenger transport services were essential for the better distribution of the population between town and country areas. It was a task for private enterprise, encouraged and assisted by the State.

In conclusion, he asked them to allow him to convey to the staff their thanks for their good work carried on under the present trying conditions.

The report and accounts were adopted unanimously.


WE
WE KEEP OUR MACHINES IN ACTION—
BY NOT USING THE BED AS AN ANVIL
BY KEEPING BEDS AND SLIDES CLEAR OF SWARF AND CHIPS
BY USING ONLY LEAD HAMMERS
BY USING ONLY SHARP CUTTING TOOLS
BY OILING AND GREASING REGULARLY
MACHINES AS MUCH AS MEN ARE FIGHTING HITLER

A poster which is being distributed throughout the engineering industry by the Machine Tool Control, Ministry of Supply, to serve as a reminder of the importance of keeping machine tools in action

Staff and Labour Matters

Railway Wages

After the meeting between the Railway Executive Committee and the National Union of Railwaymen, Associated Society of Locomotive Engineers & Firemen, and the Railway Clerks' Association on June 8, the Trade Unions decided to refer the matter to the Ministry of War Transport and after an interview with the Minister negotiations were re-opened with the Railway Executive Committee.

The Railway Executive Committee met the three trade unions on June 18 and after a meeting which lasted for about 5 hr. a settlement was reached on the claims of the trade unions. The settlement provides for an increase of 4s. 6d. a week for all adult staff with appropriate increases for juniors; the amounts for each section of staff are as follow:—

Salaried Staff
Male—
Adults £11 14s., making total war advance £53 6s. a year.
Juniors £5 17s., making total war advance £26 13s. a year.
Female—
Adults 4s. 6d., making total war advance 16s. 6d. a week
Juniors 2s. 3d., making total war advance 8s. 3d. a week

Conciliation Grades
Male—
Adults 4s. 6d., making total war advance 20s. 6d. a week
Juniors 2s. 3d., making total war advance 10s. 3d. a week
Female—
Adults 4s. 6d., making total war advance 16s. 6d. a week
Juniors 2s. 3d., making total war advance 8s. 3d. a week

Junior male conciliation staff working in adult male conciliation positions are to be paid the adult composite rate of pay, less 5s. 6d.

The increases in the war advance are to be taken into consideration in the calculation of overtime, Sunday duty, and night duty payments, also for aggregation allowances, but they are not to be taken into consideration in connection with pensions and superannuation.

The agreement takes effect as from April 26, 1943.

Railway Shopmen

A further meeting of the Railway Shopmen's National Council was held in London on June 11 in connection with the claim of the trade unions for an all round increase of 10s. a week in the wages of railway workshop staff.

The official announcement which was issued at the close of the meeting stated that no agreement was reached. It is understood that the railway representatives made an offer which was not acceptable to the trade unions, which held a meeting in London on June 17 to consider the position, and the official announcement which was made after the meeting stated that "In view of the serious position which may be created it was decided that an immediate approach should be made for an early meeting with the Railway Executive Committee and, if necessary, with the Minister of War Transport."

Motor Maintenance Workers

The National Arbitration Tribunal has recently given four awards (Nos. 352 to 355) dated May 28 on claims by the Amalgamated Engineering Union for certain specified rates and conditions for skilled mechanics, apprentices, boys, and youths employed by the Scottish Motor Traction Co. Ltd., Central Scottish Motor Traction Co. Ltd., Western Scottish Motor Traction Co. Ltd., and W. Alexander & Sons Ltd.

The claims submitted on behalf of the workmen concerned were as follow:—

1. That the minimum rate of 1s. 10⅜d. an hr. for skilled mechanics which became operative in the first pay week of January, 1943, should be applied as a minimum rate, and that individual merit rates or differential rates of certain groups, grades, or classes of skilled mechanics which were paid before the new minimum rate of 1s. 10⅜d., coming into operation, be restored and maintained.

2. That a skilled mechanic is a man exceeding 21 years of age who has served an apprenticeship of 5 years, or has worked an equivalent period at the trade, and is wholly employed on the maintenance and repair of motor vehicles or general engineering work.

3. That the agreed minimum rate and any differential rate for any special group or grade shall apply to "alternative labour" introduced under the terms of the national agreement for the temporary relaxation of existing customs and practices.

4. That all shift working and overtime shall be paid for in accordance with the terms and provisions of national agreements—day and night shift, double-day, and/or three-shift system.

5. That systems of shift-working not covered by the preceding paragraph and which are inclusive or exclusive of Sundays, shall not exceed an average of 48 hr. a week, over the complete cycle of shifts, and shall be paid for by an addition of 2d. an hr. over the ordinary day work rate for all hours worked, excluding Sundays; all hours worked between 12 midnight Saturday and 12 midnight Sunday to be paid for at double-day time-rate.

6. That the wages of apprentices, boys, and youths employed on maintenance and repair of motor vehicles or general engineering work in repair shops, running sheds, and garages shall be related to the rate of the skilled mechanics and be not less favourable than the percentage basis as provided by the national agreement.

7. The recognition of officially appointed union workshop representatives and works committees as part of the official union machinery for dealing with questions arising in the shop, shed, or garage in relation to agreed terms and conditions of employment as provided by national agreements.

During the hearing reference was made to the terms of a "model agreement" dated August 14, 1942, prepared by representatives of a number of organisations in the road passenger transport industry (including the Amalgamated Engineering Union), setting out rates of pay and conditions of employment for skilled maintenance workers in bus garages and shops, which "model agreement" was recommended for adoption by the companies and the trade unions concerned.

Four separate awards are made and are in the following terms:—

As respects Item 1 of the claim:
that individual merit rates which were being paid at the time the rate of 1s. 10⅜d. an hr. was put into operation by the company in January, 1943, shall continue to be paid over and above the national minimum rate operative from time to time under the terms of the above-mentioned "model agreement."

As respects Item 2 of the claim:
that for the purposes of this award and of the observance by the company of terms of the "model agreement," the term "skilled maintenance worker" shall have the meaning given to it by the "model agreement."

As respects Item 3 of the claim:
that where "alternative labour" is introduced to do the work of skilled maintenance workers under terms and conditions similar to the terms and conditions of the national agreements in the engineering industry relating to the temporary relaxation of existing customs and practices in the employment of skilled men, the rate to be paid to such "alternative labour" shall be the rate for skilled maintenance workers provided by the "model agreement."

As respects Items 4 and 5 of the claim:
that shift working and overtime shall be paid for in accordance with the provisions prescribed therefor by the "model agreement."

It was intimated on behalf of the companies that they took no exception to Item 6 of the claim and in these circumstances the tribunal makes no award.

The tribunal does not consider that it has jurisdiction to deal with Item 7 of the claim.

Parliamentary Notes

Railway Freights Rebates Bill

The Commons Amendment to the Railway Freight Rebates Bill was agreed to by the House of Lords on June 10, and later the same day the Bill received the Royal Assent.

Questions in Parliament

Consignment by Rail of Tomatoes

Major J. G. Braithwaite (Holderness—C.) on June 2 asked the Parliamentary Secretary to the Ministry of Food whether he would amend the Emergency Powers (Defence) Railways (Transport of Tomatoes) in respect of small quantities of tomatoes where the tomatoes to be consigned were not being consigned for sale.

Mr. W. Mabane (Parliamentary Secretary, Ministry of Food) stated in a written reply: Special provisions are being made to permit of the consignment by rail of gifts of tomatoes not exceeding one 14 lb. box to any one consignee.

L.M.S.R. and Bank Notes

Mr. J. S. Holmes (Harwich—Lib. Nat.) on June 9 asked the Parliamentary Secretary to the Ministry of War Transport whether he was aware that a Bank of England £5 note was not accepted at Euston Station in payment of a railway ticket unless the passenger signed his name and address on the back of the note and produced his national registration identity card for the inspection of the booking clerk; and by what authority the latter made these demands.

Mr. P. J. Noel-Baker (Parliamentary Secretary, Ministry of War Transport) stated in a written answer: I understand that the London Midland & Scottish Railway asks persons who tender Bank of England notes to put their names and addresses on the back. It has not given instructions that identity cards must be produced. Standard instructions to all railway booking offices as to the acceptance of bank notes are at present under consideration.

XUM

Notes and News

Turner & Newall Limited.—An interim dividend of 3¾ per cent. on the ordinary capital is again being paid.

Canadian Pacific Railway Company.—A dividend of 2 per cent. on the preference stock in respect of the year 1943 is to be paid on August 3.

South African Railways Earnings.—Earnings of the South African Railways from May 9 to June 5 were £3,219,694, compared with £2,943,275 for the corresponding period of 1942.

Compagnia Italiana Turismo (C.I.T. England) Limited.—Mr. Edward Furnival Jones, 17, St. Helens Place, Bishopsgate, E.C.3, has been appointed Liquidator of this company. The winding-up Order was dated May 12, 1941.

L.N.E.R. Stocks.—The directors of the London & North Eastern Railway Company have fixed July 1 as the date for striking the balances of the company's guaranteed, preference, and ordinary stocks. Details are given in our Official Notices on page 655.

Beyer, Peacock & Co. Ltd.—Payment is announced of a dividend on the 5½ per cent. cumulative preference shares for the half-year to December 31, 1936, and for the half-year to June 30, 1937. A payment in respect of the year to June 30, 1936, was made on January 1, 1943.

N.W.R. Locomotive Named.—The "XC" class locomotive, No. 1855, of the North Western Railway (India), which recently was painted light Indian red in connection with a trial livery scheme for engines of that system, has been named *The Great Moghul*. Reference to this locomotive was made in an editorial note in our June 4 issue.

Chinese 5 per cent. Railway Loan.—The Hongkong & Shanghai Banking Corporation announces that bonds for £57,500 of the Chinese Imperial Railway 5 per cent. gold loan of 1899 have been drawn and will become due for redemption at par on August 1. Interest will cease on the bonds becoming payable and on provision being made for their payment.

Great Western of Brazil Railway Co. Ltd.—Payment is to be made on July 16 of the half-year's interest to June 30, 1942, on the 6 per cent. permanent debenture stock and on the 4 per cent. debentures, together with interest at 4 per cent. per annum on arrears. On June 2 last payment was made of the full interest on both classes, due July 1, 1941, and January 1, 1942, plus interest on arrears.

Buenos Aires Transport Corporation.—Results for 1942, according to the Buenos Aires correspondents of Leng, Roberts & Company (London), are as follows:—

	Income	Expenditure including renewals	Net result
	pesos	pesos	pesos
Underground	13,469,982	9,227,038	+ 4,242,944
Tramways ...	41,608,906	52,470,714	− 10,861,808
Omnibuses	10,422,144	16,031,004	− 5,608,860
Micro-buses	3,645,869	3,169,361	+ 476,508
Miscellaneous	329,884	—	+ 329,884
Total ...	69,476,785	80,898,117	−11,421,332

This deficit of 11,421,332 pesos for 1942 compares with a deficit of 12,353,785 pesos for 1941 and 13,441,496 pesos for 1940. As a result of the agreements arrived at with some, and the actions taken against others, of the micro-bus owners, the Corporation will in the very near future be in possession of all the transport in the City of Buenos Aires. A notable increase in passenger traffic was experienced in the later months.

Entre Rios Railways' Further Moratorium.—The interest moratorium on the company's 5 per cent. debentures at present in force until July 1, 1943, is to be extended to July 1, 1944. It is expected that a further payment of interest on account of the arrears on the 4 per cent. debenture stock will be made shortly.

Trans-Canada Air Lines.—The number of passengers carried by Trans-Canada Air Lines in April totalled 11,537, an increase of 2,722 over the corresponding period of last year. The amount of mail conveyed was more than doubled, rising from 139,379 lb. in April, 1942, to 292,401 lb. in April last. Express traffic increased nearly four times, from 16,572 lb. to 61,577 lb.

Financial Results for Indian State Railways.—The Financial Commissioner for Railways stated recently that gross earnings of State lines in India show an increase of Rs. 5·17 crores compared with the revised budget of Rs. 144·46 crores; and that working expenses show a saving of Rs. 90 lakhs. Earnings for April, 1943, exceeded those of the same month of last year by 2 crores.

Manila Railway Co. (1906) Ltd.—The company is unable to meet this year's interest on the 4 per cent. "A" and 3½ per cent. "B" debentures, and holders are asked to sanction a year's moratorium from January 15 last. A committee is to be formed to represent the holders, and it is proposed to give this committee power to extend the moratorium for periods not extending beyond January 14, 1946.

Buenos Ayres & Pacific Moratorium Extended.—Under authority of the scheme of arrangement of October 20, 1941, the moratorium period has been extended from June 30, 1943, to June 30, 1944, in respect of interest on the following stocks:—Buenos Ayres & Pacific Railway 4½ per cent. consolidated debenture stock and 5 per cent. (1912) debenture stock; Argentine Great Western Railway 5 per cent. debenture stock, and 6 per cent. guaranteed preference stock; and Villa Maria & Rufino Railway 4½ per cent. guaranteed stock.

Ransomes, Sims & Jefferies Limited.—Income for the year 1942 after deducting provision for depreciation, bad and doubtful debts, and reserve for E.P.T., also after writing off expenditure to date on A.R.P., was £107,735. Deducting fees, debenture interest, and transfer to reserve for income tax £62,750, leaves £44,985, to which has to be added £54,624 brought forward, making £99,609. A dividend of 7½ per cent., less tax, is again paid on the ordinary stock for the year, and £20,000 is transferred to reserve for post-war reconstruction and contingencies, leaving £55,359 to be carried forward. Buildings, plant, fixtures, etc., have been well maintained out of revenue.

Birmingham & Midland Motor Omnibus Co. Ltd.—The report of this company, which is jointly controlled by the L.M.S. and G.W. Railway Companies and by the British Electric Traction Co. Ltd., shows that the balance of the profit and loss account for the year 1942 amounted to £275,605, compared with £285,915 for 1941. After deducting £50,000 (£54,742) placed to reserve and adding £132,102 brought forward, there is a sum available of £357,707, out of which it is proposed to apply £8,000 to preference dividend, £144,000 to dividend of 10 per cent., less tax, for the year on the ordinary shares, and £72,000 to a bonus of 5 per cent., less tax, on those shares, leaving £133,707 to be carried forward.

Mozambique All-Steel Dining Car.—An all-steel dining car, divided into three compartments, has been designed and constructed at Lourenço Marques, Mozambique. The largest compartment includes the first class dining room and bar, the centre section

British and Irish Railway Stocks and Shares

Stocks	Highest 1942	Lowest 1942	Prices June 18, 1943	Rise/Fall
G.W.R.				
Cons. Ord. ...	58	39	61½	− ½
5% Con. Pref. ...	115½	105½	113½	− ½
5% Red. Pref. (1950)	109½	103½	108	—
5% Rt. Charge ...	133½	123½	127½	—
5% Cons. Guar. ...	130½	121½	124½	—
4% Deb.	117	105	109½	− ½
4½% Deb.	118	108	111½	—
4½% Deb.	125	113	119½	—
5% Deb.	137	127	131	—
2½ Deb.	77	70	76	—
L.M.S.R.				
Ord.	28½	16½	32½	—
4% Pref. (1923) ...	63½	50½	62½	—
4% Pref.	76½	67½	76	—
5% Red. Pref. (1955)	103½	94½	103¼	—
4% Guar.	104½	97½	100	—
4% Deb.	108½	101½	104	—
5% Red. Deb. (1952)	111	107½	109½	—
L.N.E.R.				
5% Pref. Ord. ...	9½	2½	10½	+ ½
Def. Ord.	5	1½	4½	—
4% First. Pref. ...	62	49½	62½	—
4% Second Pref. ...	32½	18½	34½	+ ½
5% Red. Pref. (1955)	95½	79	97½	—
4% First Guar. ...	98	88	97½	—
4% Second Guar. ...	90	78	89½	− ½
3% Deb.	85	76	79	—
4% Deb.	106½	100½	102½	− ½
5% Red. Deb. (1947)	106	103	104	—
4½% Sinking Fund Red. Deb.	106	102½	105½	—
SOUTHERN				
Pref. Ord.	77	61½	75	—
Def. Ord.	23½	14½	24½	− ½
5% Pref.	112½	104	111½	− ½
5% Red. Pref. (1964)	110½	105½	112½	—
5% Guar. Pref. ...	131	121½	124½	—
5% Red. Guar. Pref. (1957)	115½	109½	114½	—
4% Deb.	116	104½	107	—
5% Deb.	134	125½	129½	—
4% Red. Deb. (1962–67)	110½	106	107½	—
4% Red. Deb. (1970–80)	111	106½	107½	—
FORTH BRIDGE				
4% Deb.	109½	108	106	—
4% Guar.	105½	100	104½	—
L.P.T.B.				
4½% "A"	122½	111	116½	—
5% "A"	131½	122	126½	—
3% Guar. (1967–72)	95½	97½	99	—
5% "B"	121	111½	116½	—
"C"	56½	38	61½	—
MERSEY				
Ord.	27½	20½	31	− ½
3% Perp. Pref. ...	61½	56½	61	—
4% Perp. Deb. ...	102½	99½	104	—
3% Perp. Deb. ...	80½	76	79	—
IRELAND				
BELFAST & C.D.				
Ord.	9	4	9	—
G. NORTHERN				
Ord.	29½	12½	17	− 2
G. SOUTHERN				
Ord.	25	10	10	—
Pref.	29	12½	14	—
Guar.	53	35½	30½	—
Deb.	71½	55½	55½	—

§ ex-dividend

OFFICIAL NOTICES

South Africa

POST War Development in South Africa opens great opportunity for Manufacturers in Great Britain and America.

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London & North Eastern Railway

NOTICE IS HEREBY GIVEN that the Directors have fixed July 1st at the close of business as the date for striking the Balances of the Company's Guaranteed, Preference and Ordinary Stocks. Interim Dividends declared for the half-year ending 30th June, 1943, will be payable only to the Stockholders whose names are registered in the books of the Company on the date so fixed.

Deeds of Transfer should, therefore, be lodged with the Registrar of the Company at Hamilton Buildings, Liverpool Street Station, London, E.C.2, before 5.0 p.m. on 1st July.

By Order,
W. H. JOHNSON,
Secretary.

Marylebone Station,
London, N.W.1.
21st June, 1943.

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has an up-to-date kitchen, and the third section has a dining room for third class passengers.

Potteries Motor Traction Co. Ltd.—This company is controlled by British Electric Traction Co. Ltd. Profit for the year 1942, after providing for taxation, depreciation, and renewals, amounted to £64,871 (£74,653) and £20,757 was brought in, making £85,628. The directors have transferred to general reserve £10,000 (£25,641) and the dividend for the year is again 10 per cent., leaving £21,503 to be carried forward.

W. T. Henley's Telegraph Works Co. Ltd.—Net profit for the year 1942 was £331,379, compared with £326,379 for 1941. An interim dividend of 5 per cent., less tax, was paid on November 30 last, and the directors now recommend a final dividend of 10 per cent. and a bonus of 5 per cent., both less tax, again making a total distribution of 15 per cent. for the year, and a transfer of £50,000 (same) to contingencies reserve, carrying forward £390,156 (£381,276).

Trade Development in South Africa.—A British company with branches and depots at Johannesburg, Durban, Port Elizabeth and Cape Town, is prepared to consider the representation of firms manufacturing railway rolling stock and equipment, road construction plant, builders supplies, road transport vehicles, and any articles of an engineering or building description, as well as stores and materials. Further details are given under "Official Notices" above.

Permanent Way Institution: Annual Meeting.—The annual summer meeting of the Permanent Way Institution will be held in Committee Room No. 390, at the offices of the London Passenger Transport Board, 55, Broadway, Westminster, S.W.1, on Saturday, July 3, at 2.30 p.m. The President, Mr. V. A. M. Robertson, C.B.E., M.C., will occupy the Chair. After the formal business, the President has arranged for members to inspect the London Transport Civil Engineering Department permanent way shops and yard at Lillie Bridge. Tea will be provided.

Devon General Omnibus & Touring Co. Ltd.—This company is jointly controlled by the British Electric Traction Co. Ltd., through its subsidiary the National Electric Construction Co. Ltd. (50 per cent.), the Great Western Railway Company (30 per cent.), and the Southern Railway Company (20 per cent.). Profit for the year 1942, after providing for taxation, war damage insurance, depreciation, etc., was £47,592 (£40,718). With the balance brought forward of £14,940, there was a total available of £62,532 (£56,793). Appropriations are made of £5,000 (nil) to reserve fund and of £1,338 (£1,353) to employees' assistance account, and the dividend of 10 per cent. and the bonus of 5 per cent. are maintained for the year on the ordinary shares, leaving £15,694 to be carried forward.

"How Many Coupled Axles?"—In an editorial note entitled "How Many Coupled Axles?" on p. 603 of our last issue an error was committed in changing a reference to locomotives of the L.N.E.R. for another relating to a G.W.R. type, with the result that the latter railway was credited with Pacifics. The figure of 3·75 for the factor of adhesion is to be taken as applying to the 4-6-0 "King" class; for the L.N.E.R. class "A4" Pacifics the factor of adhesion is 4·17, a figure which was not considered sufficiently illustrative of the development that the note was intended to portray. The corresponding figure for the *Great Bear*, the only Pacific ever built by the G.W.R., was 4·68.

Bengal-Nagpur Railway Debenture Stock.—The Bengal-Nagpur Railway Co. Ltd., with the consent of the Governor-General of India in Council, gives notice that such of the company's 4 per cent. registered debenture stock as may then be outstanding will be redeemed by the company on January 1, 1944. Holdings subject either to the Acquisition of Securities (No. 1) Order, 1943, dated January 16, 1943, issued by H.M. Treasury, or to the Government of India (Finance Department) notification No. D.307 B/43, dated January 16, 1943, issued by the Governor-General in Council, must be surrendered in accordance with the terms of those orders, and the notice of redemption is not to be considered as applying to those holdings. As from January 1, 1944, interest on the stock will cease to be payable. The necessary forms will be posted to holders on or about November 1 next.

Post Office Receipts.—According to the *Board of Trade Journal*, the average daily receipts of the Post Office in April were £208,827, or 14 per cent. more than a year ago. Between March and April there was a rise of nearly 9 per cent.

Contracts and Tenders

The South Indian Railway has placed a contract with English Steel Corporation Limited for 10 piston rods for power hammers, to the inspection of Messrs. Wolfe Barry, Robert White & Partners.

Sir Charles Newton, Chief General Manager, L.N.E.R., toasting Mr. R. Bell, who retired recently from the position of Assistant General Manager, L.N.E.R. A portrait and biography of Mr. Bell appeared in our June 4 issue

Railway Stock Market

Apart from the decidedly better tone in British Funds, general conditions in the Stock Exchange remained unchanged, sentiment having continued to be dominated mainly by the widespread disposition to await the next major war development. Home railways showed only fractional movements in the junior securities, and the prior charges, although virtually unchanged on balance, had a firmer appearance, aided by the tendency in gilt-edged; in some cases prior charges were only in moderate supply at current prices. The wage increases had little influence on sentiment, it being generally recognised that they will not affect the fixed rental payable to the railways under the financial agreement. On the other hand, the higher wages tended to draw further attention to the problems that will have to be faced after the war. Nevertheless, there is continued confidence that the railways and their stockholders will receive fair and equitable treatment in the post-war organisation of transport, particularly in view of existing sacrifices as to dividend payments and to the limitation of the latter arising from the rental agreement. There has been some talk in the market that the L.M.S.R. may decide to make an interim payment on the ordinary stock, but this is not generally expected. It may be recalled that last year in announcing the decision not to make an interim payment, the directors indicated that a cautious policy was being adopted because a considerable part of the company's income available for dividend on the ordinary stock is derived from sources outside the agreement with the Government. Nevertheless, the payment for the year was raised from 2 per cent. to 2½ per cent. At the current price L.M.S.R. ordinary yields 7¾ per cent. This compares with nearly 7½ per cent. on Great Western ordinary, and rather more than 7⅝ per cent. on L.N.E.R. second preference. No other group of active and widely-held securities offer as attractive yields, and the view prevails that there should be scope for satisfactory appreciation in home railway junior stocks when markets become active. Recent gains in Argentine railway securities were not fully held, but there appeared to be little selling. The lower prices were attributed to a disposition to await further indications of the attitude of the new Argentine Government. Sentiment as to South American railway securities generally was affected by the heavy decline in San Paulo ordinary stock. This reflected disappointment that it is necessary to draw on reserves to maintain the dividend at 2 per cent., and also the reference to high operating costs in the annual report.

Compared with a week ago, Great Western ordinary reacted from 62¼ to 61¾; the 5 per cent. preference stock was maintained at 113½, but the 4 per cent. debentures were fractionally lower at 109½. L.M.S.R. was 32⅜, compared with 32¾ a week ago; the senior preference was slightly better at 76½ and the guaranteed stock again 100½, but the 1923 preference eased to 62¼. L.N.E.R. first preference was also fractionally lower at 62¼, and the second preference 34⅛, against 34¼ a week ago; the first guaranteed remained at 97½. In accordance with the prevailing tendency, Southern deferred has eased from 24¾ to 24⅜, and the preferred from 74¾ to 74½. The latter yields over 6¾ per cent., which must be considered attractive, when judged in relation to the investment merits of this stock. Southern preference kept at 111½, and the 4 per cent. debentures at 107. There was a relatively steady tendency in London Transport "C" which has remained at 61½ at the time of writing.

After the further rise in Argentine railway securities, prices reacted sharply in some cases and there was a fairly general decline, although as already mentioned, this was attributed mainly to falling off in demand. B.A. Gt. Southern 4 per cent. debentures, after touching 64, have reacted to 62 at the time of writing, but Central Argentine 4 per cent. debentures at 51½ were slightly better on balance. Little response was shown by Great Western of Brazil stocks to the further payments on the 6 per cent. and 4 per cent. debentures. San Paulo ordinary was marked down 9 points to 60 after publication of the results. Canadian Pacifics regained part of an earlier decline.

Traffic Table and Stock Prices of Overseas and Foreign Railways

	Railways	Miles open	Week ending	Traffic for week: Total this year	Traffic for week: Inc. or dec. compared with 1941/2	No. of Weeks	Aggregate traffics to date: Totals 1942/3	Aggregate traffics to date: Totals 1941/2	Aggregate traffics to date: Increase or decrease	Shares or stock	Prices: Highest 1942	Prices: Lowest 1942	Prices: June 18 1943	Yield % (See Note)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	13.6.43	22,360	— 640	24	646,280	504,750	+ 141,530	Ord. Stk.	14	7⅞	13	Nil
	Argentine North Eastern ...	753	12.6.43	16,080	+ 1,716	50	623,148	546,114	+ 77,034	,,	6½	3	6¼	Nil
	Bolivar	174	May, 1943	5,665	+ 1,060	20	27,546	23,063	+ 4,483	6 p.c. Deb.	19¾	10	20¼	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds	20¼	9	22¼	Nil
	Buenos Ayres & Pacific ...	2,807	12.6.43	86,100	— 8,100	50	4,964,880	4,400,760	+ 564,120	Ord. Stk.	7⅞	4	7	Nil
	Buenos Ayres Great Southern	5,080	12.6.43	138,240	+ 10,320	50	8,005,500	7,312,260	+ 693,240	Ord. Stk.	12¼	7⅛	13¼	Nil
	Buenos Ayres Western ...	1,930	12.6.43	50,340	— 11,040	50	2,694,300	2,595,060	+ 992,240	,,	12⅜	6	13	Nil
	Central Argentine	3,700	12.6.43	116,790	+ 5,496	50	6,538,866	5,278,908	+ 1,259,958	,,	9½	4 1/16	9½	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	3¾	2¼	4	Nil
	Cent. Uruguay of M. Video...	972	5.6.43	37,383	+ 5,133	49	1,451,165	1,263,372	+ 187,793	Ord. Stk.	8	4	6¾	Nil
	Costa Rica	262	Apr., 1943	18,009	+ 6,463	44	150,966	212,569	— 61,603	Stk.	16¼	11	14½	Nil
	Dorada	70	May, 1943	21,939	+ 6,057	20	98,259	63,546	+ 34,713	1 Mt. Db.	90½	89	94½	6 1/12
	Entre Rios	806	12.6.43	21,234	+ 5,088	50	887,730	779,010	+ 108,720	Ord. Stk.	33	4⅛	7	Nil
	Great Western of Brazil ...	1,030	12.6.43	13,200	+ 5,200	23	367,400	238,700	+ 128,700	Ord. Sh.	9/-	9/-	53/9	Nil
	International of Cl. Amer. ...	794	Apr., 1943	$643,460	+ $92,059	16	$2,665,812	$2,597,912	+ $67,900	—	—	—	—	—
	Interoceanic of Mexico ...	—	—	—	—	—	—	—	—	1st Pref.	1⅛	5/3	2	Nil
	La Guaira & Caracas... ...	22⅛	May, 1943	9,520	+ 3,555	22	45,395	32,135	+ 13,260	5 p.c. Deb.	11⅛	5	83½	Nil
	Leopoldina	1,918	12.6.43	32,780	+ 2,756	23	759,639	694,060	+ 65,579	Ord. Stk.	6¾	5⅛	6½	Nil
	Mexican	483	7.6.43	ps. 338,200	+ ps. 29,300	21	ps. 8,269,200	ps. 7,755,200	+ ps. 514,000	Ord. Stk.	1	⅛	1¼	Nil
	Midland Uruguay	319	Apr., 1943	17,124	+ 2,741	40	152,738	137,510	+ 15,228	—	—	—	—	—
	Nitrate	382	15.6.43	4,601	— 3,257	21	66,640	71,624	— 4,984	Ord. Sh.	77/-	3⅛	80/- §	Nil
	Paraguay Central	274	11.6.43	$4,342,000	+ $1,276,000	50	$207,071,000	$177,932,000	+ $29,139,000	Pr. Lt. Stk.	53	40	52½	11⅛
	Peruvian Corporation ...	1,059	May, 1943	92,939	+ 11,934	44	940,331	833,448	+ 106,883	Pref.	19⅞	5⅛	15½	Nil
	Salvador	100	Mar., 1943	c 140,000	+ c 14,000	38	c 912,000	c 782,172	+ c 1 9,828	—	—	—	—	—
	San Paulo	153⅛	6.6.43	46,558	+ 8,243	23	857,235	810,188	+ 47,047	Ord. Stk.	59	41	69	2 8/9
	Taltal	160	May, 1943	2,390	— 3,100	25	46,206	49,710	— 3,504	Ord. Sh.	41/-	23/-	32/6	Nil
	United of Havana	1,301	12.6.43	53,237	+ 23,784	50	2,569,454	1,587,729	+ 981,725	Ord. Stk.	8¼	2½	6¼	Nil
	Uruguay Northern	73	Apr., 1943	1,425	+ 431	43	14,074	12,084	+ 1,990	—	—	—	—	—
Canada	Canadian Pacific	17,034	14.6.43	1,097,600	+ 166,800	23	24,472,000	21,827,800	+ 2,644,200	Ord. Stk.	16¾	9 7/16	16	Nil
India†	Barsi Light	202	May, 1943	19,193	+ 5,355	8	45,240	26,693	+ 18,547	—	—	—	—	—
	Bengal & North Western ...	2,090	Nov., 1942	264,975	— 33,087	8	449,400	561,082	— 111,682	—	—	—	—	—
	Bengal-Nagpur	3,267	Feb., 1943	932,775	+ 84,975	46	10,031,400	9,111,000	+ 920,400	Ord. Stk.	102¼	88	102½	3 9/19
	Madras & Southern Mahratta	2,939	31.3.43	336,300	+ 67,879	50	8,784,714	7,402,556	+ 1,382,158	,,	105¼	87	107½	6 3/5
	Rohilkund & Kumaon ...	571	Nov., 1942	555,750	+ 5,072	8	115,950	99,909	+ 16,041	—	—	—	—	—
	South Indian	2,402	10.1.43	166,555	+ 778	39	4,928,736	4,148,309	+ 780,427	,,	103¾	88⅞	102 1/16 §	4⅛
Various	Egyptian Delta	607	10.5.43	14,585	+ 3,993	5	56,347	42,763	+ 13,584	Prf. Sh.	5½	1⅛	4	Nil
	Manila	—	—	—	—	—	—	—	—	B. Deb.	44	35	36	9 11/18
	Midland of W. Australia ...	277	Apr., 1943	34,426	+ 8,799	40	320,996	203,110	+ 17,886	Inc. Deb.	95	90	98§	6¼
	Nigerian	1,900	27.2.43	72,670	— 24,705	46	3,262,161	2,894,620	+ 367,541	—	—	—	—	—
	South Africa	13,291	8.5.43	885,689	+ 140,973	5	4,608,221	4,180,541	+ 427,680	—	—	—	—	—
	Victoria	4,774	Jan., 1943	1,480,058	+ 169,521	—	—	—	—	—	—	—	—	—

Note. Yields are based on the approximate current prices and are within a fraction of ⅛

† Receipts are calculated @ 1s. 6d. to the rupee

Argentine traffics are given in sterling calculated @ 16⅜ pesos to the £

§ ex dividend

Note)

XUM